

Reed, Angel

From: Schendel, John
Sent: Friday, October 14, 2011 4:17 PM
To: Terry Stilman; Harper.Greg@epamail.epa.gov
Cc: jones.katrina@epa.gov; Reed, Angel; Johnson, Andy; Harrigan, Sandra; Mayer, Randy
Subject: TTEMI-05-003-0078, Vermiculite Exfoliation Site GAO 148: Submittal of Draft Removal Assessment Report
Attachments: 05-003-0078_Vermiculite GAO 148_RAR_Draft_101411.pdf

Dear Terry and Greg,

Attached please find the draft removal assessment report for the GAO 148 vermiculite site in Woodruff, South Carolina. This report does not include certain elements that are too large to send via email (Appendix G; Attachments 1 through 3); these items will be included in the final hard copy version of the report. Please call me if you have any questions or comments. Thanks! - John





QUALITY CONTROL REVIEW SHEET

Job Number: 103DX9017000300780001.O	Contract Name: EPA START III Region 4 Contract No. EP-W-05-054
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QCC: Sandra Harrigan	Estimated Hours:	Due Date: 10/14/11, AM	Regulatory Review <input type="checkbox"/> Other: <input type="checkbox"/>
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(Attach Separate QC Review Sheets to Document These Reviews)			

Editorial Reviewer: None	Est. Hours:	Date Due:	Review Date:	Signature:
Report Item	No Changes	See Text For Changes	Please Call to Discuss	Comments
Overall Organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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Clarity, Consistency, Grammar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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Tables/Figures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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Technical Reviewer: John Schendel	Est. Hours: 36	Date Due: 10/5/11	Review Date: 10/12/11	Signature: John Schendel
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Intended Scope Stated	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See edits and comments in electronic track edit mode.
Technical Adequacy	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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Conclusions Justified	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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Digitally signed by John Schendel
DN: cn=John Schendel, o=Tetra Tech EM, Inc., ou,
email=john.schendel@tetratech.com, c=US
Date: 2011.10.12 18:14:40 -04'00'

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Report Item	YES	NO	N/A	Initials	Comments
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QCC Notes:
See hard copies for comments.

QCC Final Confirmation Signature:

Sandra Harrigan

Digitally signed by Sandra
Date: 2011.10.14 12:29:05 -04'00'

Date: 10/14/11



TETRA TECH

October 14, 2011

Mr. Terry Stilman
On-Scene Coordinator
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

**Subject: Draft Removal Assessment Report
Activity-Based Air and Bulk Material Sampling Event
Vermiculite Exfoliation Site GAO 148
EPA Contract No. EP-W-05-054 (START III Region 4)
Technical Direction Document (TDD) No. TTEMI-05-003-0078**

Dear Mr. Stilman:

The Tetra Tech EM Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) submits this draft removal assessment report for the activity-based air and bulk material sampling event that was conducted on December 2 and 3, 2009, and follow-up site visit conducted on March 21, 2011, at the Vermiculite Exfoliation GAO 148 site located in Woodruff, Spartanburg County, South Carolina. This report presents site background information, summarizes the sampling and other work that was conducted during the field events, and presents the analytical results from the laboratory analysis of the samples collected.

Please call Randy Mayer at (678) 775-3110 or Sandra Harrigan at (678) 775-3088 if you have any questions regarding this removal assessment report.

Sincerely,

Randy P. Mayer
START III Project Manager

Andrew F. Johnson
START III Program Manager

Enclosure

cc: Katrina Jones, EPA Project Officer
Angel Reed, Tetra Tech START III Document Control Coordinator

DRAFT
REMOVAL ASSESSMENT REPORT
ACTIVITY-BASED AIR AND BULK MATERIAL SAMPLING EVENT

VERMICULITE EXFOLIATION SITE
GAO 148
WOODRUFF, SPARTANBURG COUNTY, SOUTH CAROLINA

Prepared for
U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 4
Atlanta, Georgia 30303



Contract No.	:	EP-W-05-054
TDD No.	:	TTEMI-05-003-0078
Date Prepared	:	October 14, 2011
EPA Task Monitor	:	Terry Stilman
Telephone No.	:	(404) 562-8748
Prepared by	:	Tetra Tech Inc.
START III Project Manager	:	Randy Mayer
Telephone No.	:	(678) 775-3110

Prepared by

Randy P. Mayer
START III Project
Manager

Reviewed by

John Schendel
START III Technical
Reviewer

Approved by

Andrew F. Johnson
START III Program
Manager

CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1
2.0 SITE BACKGROUND	3
2.1 SITE HISTORY	3
2.2 SETTING	5
3.0 SUMMARY OF SAMPLING ACTIVITIES	5
3.1 METEOROLOGICAL MONITORING	8
3.2 FIELD QUALITY CONTROL SAMPLING	9
3.3 BACKGROUND AIR SAMPLING	10
3.4 AGGRESSIVE AIR AND BULK MATERIAL SAMPLING	12
3.5 ACTIVITY-BASED AIR AND BULK MATERIAL SAMPLING	12
3.5.1 Activity-Based Sampling Round 1: Activities Conducted by Palmetto Vermiculite Personnel	16
3.5.2 Activity-Based Sampling Round 2: Sweeping	17
3.5.3 Activity-Based Sampling Round 3: Raking	18
3.6 ADDITIONAL BULK MATERIAL SAMPLING	19
3.7 FOLLOW-UP SITE VISIT ON MARCH 21, 2011	20
3.8 DISPOSAL OF INVESTIGATION-DERIVED WASTE	20
4.0 SAMPLE ANALYSIS	21
5.0 DATA VALIDATION	22
6.0 PRESENTATION OF ANALYTICAL RESULTS	23
6.1 METEOROLOGICAL MONITORING DATA	23
6.2 FIELD QUALITY CONTROL SAMPLE RESULTS	24
6.3 BACKGROUND AIR SAMPLE RESULTS	26
6.4 AGGRESSIVE AIR AND BULK MATERIAL SAMPLE RESULTS	27
6.5 ACTIVITY-BASED AIR AND BULK MATERIAL SAMPLE RESULTS	27
6.5.1 Activity-Based Sampling Round 1: Activities Conducted by Palmetto Vermiculite Personnel	27
6.5.2 Activity-Based Sampling Round 2: Sweeping	29
6.5.3 Activity-Based Sampling Round 3: Raking	30
6.6 ADDITIONAL BULK MATERIAL SAMPLE RESULTS	31
7.0 RECONCILIATION OF THE DATA TO PROJECT-SPECIFIC DATA QUALITY OBJECTIVES	32
8.0 REFERENCES	33

Appendices

A	FIGURES
B	TABLES
C	LOGBOOK NOTES AND FIELD SHEETS
D	PHOTOGRAPHIC LOG
E	TABLE OF WITNESSES
F	SAMPLE CHAINS-OF-CUSTODY AND SPREADSHEETS
G	SCRIBE DATABASE (ON COMPACT DISC)

Attachments

1	DATA VALIDATION REPORTS (ON COMPACT DISC)
2	METEOROLOGICAL MONITORING DATA (ON COMPACT DISC)
3	LABORATORY DATA PACKAGES (ON COMPACT DISC)



1.0 INTRODUCTION

Under Superfund Technical Assessment and Response Team (START) Contract Number (No.) EP-W-05-054, Technical Direction Document No. TTEMI-05-003-0078, the U.S. Environmental Protection Agency (EPA) tasked Tetra Tech EM Inc. (Tetra Tech) to prepare a removal assessment report (RAR) for an activity-based sampling (ABS) and bulk material sampling event that was conducted on December 2 and 3, 2009, and a follow-up site visit conducted on March 21, 2011, at the vermiculite exfoliation site GAO 148 (GAO 148) located in Woodruff, Spartanburg County, South Carolina. The purpose of this RAR is to describe the field activities conducted and the sampling methods that were followed; present the type, number, and location of the samples that were collected during the sampling event; and present the laboratory analytical data for the samples that were analyzed. The sampling event and follow-up site visit were led by the EPA Region 4 Emergency Response and Removal Branch with Tetra Tech's technical assistance.

All activities and procedures discussed and described in this RAR were conducted in accordance with the Tetra Tech *Draft Sampling and Analysis Plan* (SAP) dated November 16, 2009 and approved as final by the EPA On-Scene Coordinator (OSC) on March 9, 2010 (Reference [Ref.] 1). Tetra Tech conducted site activities in general accordance with the SAP and applicable EPA and other guidance documents cited in the SAP to ensure that the project data quality objectives (DQO) were met. These guidance documents specifically apply to various aspects of field events, including sampling locations, sample types, sampling procedures, general sample analysis, field quality assurance and quality control (QA/QC), and related topics (Refs. 2 through 8). Other guidance documents – some of which were not cited in the SAP – primarily governing sample analysis (Refs. 9 through 14) and data validation (Refs. 15 through 17) were also applied to this project. The SAP was intended as a general, flexible guidance document that would not inhibit significant refinement in the approach that was anticipated for the field event resulting from unexpected site conditions, personal observations, and professional opinions of field personnel. This refinement process led to deviations in actual field or other project-related activities from the specifications presented in the SAP and the guidance documents cited in the SAP. Most of these deviations are described in this RAR and reflect the careful oversight conducted and recommendations made by the EPA OSC, as well as observations and recommendations made by Tetra Tech, during the December 2009 field event at the GAO 148 site. Refer to the logbook notes and field sheets presented in Appendix C for a detailed record of the activities and procedures conducted at the GAO 148 site during the field event.

The primary objective of the December 2009 ABS and bulk material sampling field event conducted at the GAO 148 site was to evaluate potential human exposures from disturbance of materials potentially contaminated with asbestos by conducting specific activities at the site. Sampling at the site occurred during or in association with various disturbance-type activities and included collection of air samples and bulk material samples (consisting of debris, soil, and what was reported to be concentrated vermiculite). The air sampling activities at the GAO 148 site included collection of a background air sample to quantify any background levels of asbestos in the air and ABS air samples. Lot blanks and field blanks were also collected from the filter media used to collect the air samples. One bulk material sample consisting of soil and debris was collected in association with one of the three ABS air sampling rounds that were conducted. Four additional bulk material samples (consisting of what was reported to be concentrated vermiculite) not directly associated with specific disturbance-type activities were also collected during the December 2009 sampling event. Though presented as possibilities in the SAP, indoor aggressive air sampling and the collecting of vermiculite attic insulation (VAI) samples and microvacuum dust samples did not occur during the field sampling event at the GAO 148 site due to site conditions. In addition, weather was monitored to establish site-specific meteorological parameters such as wind direction and wind speed. The air and bulk material samples collected were submitted for analysis of asbestos. The bulk material samples were also analyzed for water (moisture) content and particle size distribution.

The sampling and analysis described and the data presented in this RAR were intended to assist in evaluating the presence or absence of asbestos at the site. If asbestos was found to be present, a subsequent objective of the sampling event was to determine whether the asbestos identified is of the type that originated from the W.R. Grace vermiculite mine in Libby, Montana. A final objective for this work was to support an evaluation of the need for further investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); this evaluation will involve a risk assessment conducted separately under EPA's guidance and direction, using the analytical data generated from this field investigation and the subsequent laboratory analysis.

The remainder of this RAR for the ABS and bulk material sampling event conducted at the GAO 148 site is organized as follows:

- Section 2.0 describes the site, its background information, and the general site setting.
- Section 3.0 summarizes the field activities, including the sampling conducted during the December 2009 ABS and bulk material sampling event and the follow-up site visit conducted on March 21, 2011.

- Section 4.0 discusses the laboratory analysis of the samples collected.
- Section 5.0 summarizes validation of the sample data generated by the laboratories.
- Section 6.0 presents the laboratory analytical results for the samples collected.
- Section 7.0 discusses reconciliation of the data to project-specific DQOs.
- Section 8.0 presents the references cited in this RAR.
- Appendix A contains figures showing the site location, site layout, and the sample locations.
- Appendix B provides tables presenting the samples, sample locations and descriptions, air sampling durations, total air volumes sampled, and the laboratory analytical results for the samples analyzed.
- Appendix C provides the logbook notes and field sheets.
- Appendix D presents the photographic log.
- Appendix E contains a table of witnesses for the field events, including the March 21, 2011 follow-up site visit.
- Appendix F provides the sample chains-of-custody (COC) forms and the spreadsheets prepared for uploading the sample collection data into a Scribe database.
- Appendix G presents the Scribe database on compact disc (CD).
- Attachment 1 provides the data validation reports on CD.
- Attachment 2 provides the meteorological monitoring data on CD.
- Attachment 3 provides the laboratory data packages on CD.

2.0 SITE BACKGROUND

2.1 SITE HISTORY

The GAO 148 site is located at 13101 Highway 221, Woodruff, Spartanburg County, South Carolina, 29388. The geographic coordinates for the site are latitude 34.697746 degrees north and longitude 81.998782 degrees west (Ref. 18). Appendix A, Figure 1 shows the site location and Figure 2 presents the overall site layout, including the approximate property boundary. The property boundary that includes the GAO 148 site covers about 23 acres (Ref. 19), and includes two businesses: Palmetto Vermiculite, Inc., which generally occupies the northwestern portion of the property; and Quality

Haulers, Inc., which generally occupies the southeastern portion of the property. The portion of the property occupied by Palmetto Vermiculite, Inc. was the focus of this investigation. The remainder of this section describes only that portion of the property.

At the time of the field event, the portion of the property occupied by Palmetto Vermiculite, Inc. consisted of a large building complex, within which were: offices; vermiculite exfoliation furnaces, hoppers, conveyors, silos, and related machinery; several large, covered storage bays where materials including what was reportedly concentrated vermiculite from various sources were stored; and other machinery and equipment. Products sold by Palmetto Vermiculite, Inc. include exfoliated vermiculite, cement, gravel, and sand (Ref. 20). The building complex had exterior walls that covered part but not all the perimeter of the complex, which rendered large portions of the interior of the complex susceptible to the influence of wind and weather to varying degrees. The remaining portion of the property occupied by Palmetto Vermiculite, Inc. was open and consisted of bare ground, gravel-covered areas, and areas covered in low vegetation. Semi-trailers were stored in some of the outdoor areas. Some trees bordered the property along its northwestern perimeter, and a large electric power line crossed the corner of the property north of the complex.

Information regarding the history of the GAO 148 site was provided by EPA and other sources (Refs. 21 through 24). The available file material indicates that the GAO 148 site is the location of a former and currently-operating vermiculite exfoliation facility that processes vermiculite obtained from both domestic and foreign sources. The facility reportedly began operations in 1988 (Ref. 23), although some files suggest that vermiculite exfoliation operations may have begun at the site as early as 1964 (Refs. 21 and 22). The vermiculite exfoliation facility has reportedly purchased vermiculite ore from suppliers located in South Carolina, Virginia, Georgia, New Jersey, South Africa, and China (Refs. 21 through 23; also see Appendix C). The facility reportedly processes vermiculite for use in horticultural products, lightweight cements, plaster, and other products (Refs. 21 and 22). An EPA database compiled from W.R. Grace shipping invoices did not contain any records indicating that vermiculite ore from the W.R. Grace vermiculite mine in Libby, Montana were shipped to the GAO 148 site (Refs. 21 and 22). Palmetto Vermiculite, Inc. has claimed that it “never purchased, received or processed any ore from Libby” (Ref. 23). Samples of various ores, waste rock, and finished product were collected at the site by EPA Region 4 on June 6, 2001; the samples were submitted for analysis for asbestos by polarized light microscopy (PLM) (Refs. 21 through 24). The EPA report indicated that asbestos was not detected in the samples collected from the GAO 148 site, although the laboratory’s results attached to the EPA report indicated that “Mineral Fibers of Concern” were identified in two of the samples; a footnote in the laboratory’s

results states that: “Mineral Fibers of Concern represent a newer class of amphibole categories that has been identified by the USEPA Region 8 in conjunction with the Libby, MT project. These include richterite and winchite” (Refs. 23 and 24). Based on information gathered regarding the GAO 148 site, EPA concluded that further investigation at the site was required.

2.2 SETTING

The GAO 148 site is located about 25 miles southeast of downtown Greenville, South Carolina, in a mostly undeveloped rural area of mixed agricultural, industrial, commercial, and residential use. The GAO 148 site is bordered to the southwest by U.S. Highway 221 (Laurens Road) and a CSX railroad line. To the northwest and northeast the site is bordered by forest and areas of low vegetation (Ref. 18). Some areas to the southwest, northwest, and north of the GAO 148 site appear disturbed in recent and historical aerial photographs, suggesting that they may have been involved in mining or quarrying operations in the past (Refs. 18 and 19). The site is bordered to the southeast by industrial and commercial businesses, including Quality Haulers, Inc., which – as indicated earlier – lies within the same property boundary as Palmetto Vermiculite, Inc. To the southeast beyond these businesses is Kilgore Bridge Road. A market and restaurant are located about 450 feet south-southeast of Palmetto Vermiculite, Inc. Residential areas exist near the site in most directions, and the nearest residence lies less than 650 feet southeast of Palmetto Vermiculite, Inc (see Appendix A, Figure 2). The nearest church is located approximately 0.75 mile southeast of Palmetto Vermiculite, Inc., and the nearest school, Woodruff Primary School, is located about a 2.25 miles north-northwest of Palmetto Vermiculite, Inc. (Ref. 18).

3.0 SUMMARY OF SAMPLING ACTIVITIES

On December 2 and 3, 2009, Tetra Tech START and EPA conducted ABS and bulk material sampling at the GAO 148 site. In addition, Tetra Tech START and EPA conducted a follow-up site visit on March 21, 2011, which did not involve additional sampling. This section summarizes the field activities that were conducted during these field events. Although the general approach to conducting the December 2009 sampling event was outlined in the SAP (Ref. 1), sampling approaches, locations, and the number of samples collected were refined and modified in response to site conditions at the time of the field event. As stated earlier, most deviations are described in this RAR if actual field or other project-related activities deviated from specifications presented in the SAP (or in the guidance documents cited therein).

Field participants included personnel from EPA Region 4 and Tetra Tech START, and their names and responsibilities were as follows:

- | | |
|----------------------------------------|-------------------|
| • Leonardo Ceron, EPA Region 4 | OSC, Task Monitor |
| • Terry Stilman, EPA Region 4 | OSC, Task Monitor |
| • John Schendel, Tetra Tech START | Project Manager |
| • Randy Mayer, Tetra Tech START | Field Team Leader |
| • Spencer Smith, Tetra Tech START | Field Team Member |
| • Debbie Kristiansen, Tetra Tech START | Field Team Member |
| • Vicky Farmer, Tetra Tech START | Field Team Member |
| • James Ferreira, Tetra Tech START | Field Team Member |
| • Wendy Robinson, Tetra Tech START | Field Team Member |

Logbook notes and field data sheets resulting from the field events at the GAO 148 site are contained in Appendix C, and a photographic log is presented in Appendix D. A table of witnesses that provides contact information for the individuals presented above and others is presented in Appendix E.

Tetra Tech processed all samples collected during the field events using the EPA Scribe software, which generated a project database. The project Scribe database was used to generate COC forms for shipping the samples to the laboratory. Appendix F presents the spreadsheets prepared for uploading the sample collection information into the Scribe database and also provides copies of the COCs generated from the Scribe database.

Data from the laboratory analysis of the samples may also be uploaded into the project Scribe database. The database will be stored at the Tetra Tech office in Duluth, Georgia until data entry is completed; once completed, the database will be submitted to EPA. The project Scribe database is presented in Appendix G; currently, the database contains only sample collection information and not data from the analysis of the samples.

Some of the deviations from specifications presented in the SAP (Ref. 1) relate to sampling procedures, flow-rate measurement, and sampling locations. The deviations described here apply to all major aspects of the sampling event conducted at the GAO 148 site.

On December 2, 2009, the meteorological station was positioned northeast of the large building complex at the GAO 148 site, near the site's property boundary (see Appendix A, Figures 3). This location was chosen because it was considered – based on the observed wind direction at the beginning of the day – to have been relatively free from the influence of buildings, trees, and other structures that might have prevented accurate measurement of general weather conditions at the GAO 148 site, such as wind direction and speed. On December 3, 2009, the meteorological station was positioned northwest of the large building complex, within the GAO 148 site property boundary (see Appendix A, Figures 4). This location was also chosen because it was relatively far from buildings, trees, and other structures that might have prevented accurate measurement of general weather conditions at the GAO 148 site.

During the December 2 and 3, 2009 field event, the field team used personal observations of wind direction and relative wind speed while field activities were underway to support selecting (1) staging locations for personnel and the decontamination station, (2) the background air sampling location, and (3) the upwind and downwind perimeter air sampling locations associated with each ABS event (see Appendix A, Figures 3 and 4). While some of these observations were recorded in the logbook notes (Appendix C), no attempt was made to hand-record detailed, personal observations of the weather, primarily because the meteorological station's data were relied upon to be the official record of weather conditions during the ABS field events. The data recorded on December 2 and 3, 2009 by the on-site meteorological station are presented in Attachment 2.

3.2 FIELD QUALITY CONTROL SAMPLING

The SAP (Ref. 1) specifies the types and quantities of the field quality control samples that were planned for the sampling event at the GAO 148 site. These quality control samples included lot blanks and field blanks associated with the air samples, and field duplicate samples. The lot blanks were unused air sample cassettes that were stored offsite for the duration of the December 2009 field event; these blanks were used to determine whether the sample-collection media were affecting the analytical results for the air samples. The field blanks were unused air sample cassettes that were taken to the GAO 148 site and stored in the same containers from which air sample cassettes were withdrawn for use in sampling; these blanks were used to determine whether the sample-collection media were being contaminated through field handling (not including collecting air samples) and thus affecting the analytical results of the air samples. Two lot blanks and two field blanks associated with the air samples were collected during the December 2009 air sampling event at the GAO 148 site; each blank consisted of an unused 25-millimeter (mm) diameter, 0.8-micrometer (μm) mixed cellulose ester membrane (MCE) air filter cassette. All lot

blanks and field blanks were submitted to the laboratory for analysis. The lot and field blank sample information is provided in Appendix B, Table 1, and the laboratory analytical results for these samples are presented in Appendix B, Table 2. The analytical results will be discussed later in this RAR.

The SAP specifies that field duplicate samples were to be collected for each type of sample matrix at a frequency of one per sampling event or for every 20 samples, whichever is more frequent. Field duplicate samples are intended to measure precision for both the field sampling procedures and the laboratory analyses. The sample matrices for the December 2009 sampling event conducted at the GAO 148 site included:

- Background air samples
- Backpack (participant breathing zone) high flow rate air samples associated with an ABS round (ABS backpack high flow rate air samples)
- ABS backpack low flow rate air samples
- Perimeter upwind high flow rate air samples associated with an ABS sampling round (ABS perimeter upwind high flow rate air samples)
- ABS perimeter upwind low flow rate air samples
- ABS perimeter downwind high flow rate air samples
- ABS perimeter downwind low flow rate air samples
- ABS bulk material samples
- Additional bulk material samples

Field duplicate samples were collected, however, for only the following matrices: ABS backpack low flow rate air samples, ABS perimeter upwind high flow rate air samples, and ABS perimeter upwind low flow rate air samples. Further information and the laboratory analytical results for the field duplicate samples collected during the GAO 148 site sampling event are presented in tables in Appendix B that are referenced in subsequent sections of this report.

3.3 BACKGROUND AIR SAMPLING

Background air samples were collected on only one of the two days of sampling during the December 2009 field event at the GAO 148 site. On December 2, 2009 background air sampling was not conducted due to the occurrence of heavy rain. On December 3, 2009, however, background air sample G148-BKA-19 was collected (see Appendix A, Figure 4). The information for this background air sample is provided in Appendix B, Table 3, and the laboratory analytical results for this sample are presented in Appendix B, Table 4. The analytical results will be discussed later in this RAR.

The SAP specifies that the inlets of the air filter cassettes should be positioned downward during sampling. This requirement was generally achieved because the weight of each cassette deflected its inlet downward as it hung on the end of the sample tubing. In addition, the SAP specifies that for stationary air sampling locations located outdoors, the air filter cassettes should be positioned perpendicular to the wind direction. This requirement was also generally achieved for the same reason given above, assuming that the wind generally blew parallel to the ground surface. However, the exact position of each air filter cassette inlet was not confirmed to be precisely downward-facing; it is more likely that each cassette's inlet was pointing generally downward but at an angle. The SAP also specifies that the air filter cassettes for all stationary air sampling locations be mounted on a 4- to 5-foot-tall tripod stand. The tripod stands used during the December 2009 sampling event were approximately 4.5 feet tall, and the air filter cassettes were mounted on the stands such that the open-faced inlets of the cassettes generally hung at a height of about 4 feet above the ground surface, although individual cassette inlet heights may have varied above and below this height by several inches.

In addition, the SAP specifies that the air flow rates of all air sampling trains (filter cassette, tubing, and air pump) used to collect air samples at the GAO 148 site should be measured using a rotameter or Bios DryCal DC-Lite primary flow meter before and after samples were collected. Air flow rates of all air sampling trains used during the field sampling event at the GAO 148 site were measured using rotameters provided by Tetra Tech, instead of using the Bios DryCal DC-Lite primary flow meter. One rotameter capable of measuring a high flow rate range was used to measure the flow rates of the sampling trains prepared for high flow rate air sampling, and another rotameter with a lower flow rate range was used to measure the flow rates of the sampling trains prepared for low flow rate air sampling. The Bios DryCal DC-Lite flow meter was not used because measuring flow rates in the dusty field environment could damage the flow meter. Also the Bios DryCal DC-Lite can be a more time-consuming instrument of measurement than a typical rotameter. Furthermore, while air flow rates of all air sampling trains were measured before sampling was begun, their post-sampling-period flow rates were typically not measured after sample collection had ended. Instead, the post-sampling flow rates for most if not all air sampling trains were typically measured while they were still collecting air at their sampling locations, near the ends of their sampling periods. These near-end-of-sampling flow rate measurements were used in place of literal post-sampling flow rates.

The SAP also specifies that the background air sample location should be positioned upwind of the GAO 148 site and 30 degrees away from the prevailing wind line. It further specifies that the upwind perimeter air sample locations associated with the ABS air sampling rounds be positioned upwind of their

respective activities, 30 degrees away from the prevailing wind line, and on the opposite side of the prevailing wind line as the background air sample location. The locations for all of these samples were chosen to be upwind and were based on local weather forecast information and observations made at the site at the time of sampling. The requirement of positioning these samples 30 degrees away from and on opposite sides of the prevailing wind line was generally not followed. Tetra Tech's decision on where to place a sample was determined less by strict adherence to the specified requirements than limitations posed by topography and the presence of structures and trees that influenced local wind flow. This was especially true for the two ABS air sampling rounds conducted within the large building complex on December 2, 2009, where the structure's walls, machinery, and other materials, combined with the building's many openings to the outdoors, likely had a significant influence on wind flow through its interior spaces. In addition, the wind direction and speed varied over time during the two-day ABS air sampling field event at the GAO 148 site due to changes in weather conditions and the influence on wind patterns caused by obstacles on and in the vicinity of the site. If the wind direction changed during an ABS air sampling round, it may have caused upwind and downwind stationary air sampling locations to switch (or share) roles, effectively making the designations "upwind" and "downwind" ambiguous for the samples collected.

Further details regarding the sampling during the December 2009 GAO 148 site field event are presented in the following subsections.

3.1 METEOROLOGICAL MONITORING

Tetra Tech supplied a portable meteorological station for use during ABS activities at the GAO 148 site to measure wind speed, wind direction, temperature, and other meteorological parameters in real time. Aside from its use to help evaluate site conditions and guide activities while the sampling event was taking place, the meteorological station's data were stored for later retrieval in evaluating the laboratory data from the analysis of the samples.

The meteorological station was used at the site during the ABS-related field events on December 2 and 3, 2009. A malfunction of the meteorological station occurred during both days, however, which interrupted continuous logging of some meteorological parameters during the air sampling activities that were conducted. Therefore, the data for some meteorological parameters may not be available for some time periods over which the air sampling activities were occurring during the field event.

The SAP (Ref. 1) specifies that background air samples should be collected concurrent with all site activities each day of the sampling event at the GAO 148 site, and, as indicated above, this requirement was not met for December 2, 2009, the first of the two-day sampling event. The requirement was generally followed for the second day (December 3, 2009), although background air sampling ceased up to about 40 minutes before the last of the bulk material samples had been collected. This circumstance was not a cause for concern.

The SAP also specifies that the background air samples should be collected off site or at the site perimeter and upwind at a distance sufficient to prevent real-time influence by the ABS sampling activities conducted at the site. Figure 4 in Appendix A shows that the background air sample (G148-BKA-19) collected on December 3, 2009 was positioned northwest of the large building complex, within the GAO 148 site property boundary. This background air sampling location was more than 200 feet from and considered – according to observations made of the prevailing wind direction – to have been generally upwind relative to ABS air sampling Round 3 before that event began. This location was also relatively far from buildings, trees, and other structures that might have influenced site weather conditions such as wind direction and speed.

Within the limitations posed by site and weather conditions, the location for the December 3, 2009 background air sample was chosen in an attempt to reflect the prevailing air conditions upwind of and in the general area around the GAO 148 site. The background air sample collected on that day, however, was not upwind of all portions of the GAO 148 site. In addition, wind direction and speed varied over time during the December 3, 2009 air sampling event due to changes in weather conditions and the influence on wind patterns caused by obstacles on and in the vicinity of the site. Changes in wind direction that occurred during the December 3, 2009 air sampling activities added a degree of uncertainty to the designation “upwind” assigned to the background air sample collected on that day.

The SAP specifies that the sampling duration for the background air samples be a minimum of 480 minutes (8 hours). The background air sampling duration of 160 minutes for December 3, 2009 was less than 480 minutes, primarily because the ABS activities conducted on that day spanned a period of less than 480 minutes. Once ABS air sampling activities were completed for the day, the background air sampling was also ceased, causing the background air sampling duration to be shorter than the required minimum.

3.4 AGGRESSIVE AIR AND BULK MATERIAL SAMPLING

No indoor aggressive air sampling (and associated bulk material sampling) activities were conducted at the GAO 148 site. This was due to certain characteristics of site's large building complex. The building complex had exterior walls that covered part but not all of the perimeter of the complex, which rendered large portions of the interior of the complex susceptible to the influence of wind and weather to varying degrees. Based on the building's design, it was determined by the EPA OSC that the building complex was too open and exposed to the influences of weather to successfully conduct an indoor aggressive air sampling event. Instead (refer to Section 3.5), two ABS air sampling rounds were conducted at separate locations inside the site's building complex.

3.5 ACTIVITY-BASED AIR AND BULK MATERIAL SAMPLING

As stated in the SAP (Ref. 1), ABS air sampling was conducted at the GAO 148 site to simulate human exposure to asbestos during typical site activities. Three rounds of ABS air sampling were conducted at the GAO 148 site on December 2 and 3, 2009. In a departure from the SAP, which specifies that ABS be conducted outside, the first two rounds of ABS air sampling were conducted inside the large building complex at the GAO 148 site. This was due to the same reasons discussed in Section 3.4 that prohibited effective application of an indoor aggressive air sampling event. Because much of the interior of the complex was so susceptible to the influence of wind and weather, it was determined that conducting ABS air sampling inside the structure would be more appropriate. The first of the two ABS air sampling rounds conducted inside the structure did not include EPA and Tetra Tech START conducting a simulated activity; instead, several ABS perimeter high and low flow rate air sample sets were arrayed around an area where actual Palmetto Vermiculite, Inc. personnel were conducting work activities. The second indoor ABS air sampling round did involve EPA and Tetra Tech START personnel conducting a simulated activity in the form of sweeping, although Palmetto Vermiculite, Inc. personnel were also conducting work activities in the vicinity during this ABS round (see Appendix A, Figure 3). The third round of ABS air sampling was conducted outside and involved EPA and Tetra Tech START personnel conducting a simulated raking activity (see Appendix A, Figure 4). Each round of ABS air sampling was conducted for a period of 120 minutes.

Air samples were prepared and arranged in the following way for each of the ABS air sampling rounds that were conducted. For ABS air sampling Rounds 2 and 3 – where EPA and Tetra Tech START conducted a simulated activity – a collocated set consisting of one high flow rate air sample and one low

flow rate air sample (not including field duplicate samples) was collected from the breathing zone of the participants who swept or raked over the course of each ABS round. The breathing zone can be visualized as a hemisphere approximately 6 to 9 inches around an individual's face. The air pumps for these samples were held in a backpack on the participant's back, and therefore these samples constituted the ABS backpack high flow rate and low flow rate air sample set. As stated above, EPA and Tetra Tech START did not conduct a simulated activity during ABS air sampling Round 1 because this round involved air sampling in an area where actual Palmetto Vermiculite, Inc. personnel were conducting work activities. Because the Palmetto Vermiculite, Inc. personnel did not carry any air samples, breathing zone samples (ABS backpack high and low flow rate air sample sets) were not collected during Round 1. During ABS air sampling Rounds 2 and 3, each participant engaged in conducting the activity for only a portion of each approximately 120-minute round, in order to avoid overheating and overexertion. When a participant's shift ended before the end of the round, the backpack with the ABS backpack high flow rate and low flow rate air sample set (plus any field duplicate samples) was transferred to another participant who took the next shift.

For all three ABS air sampling rounds conducted at the GAO 148 site, an array of four collocated sets of air samples – each set consisting of one ABS perimeter high flow rate air sample and one ABS perimeter low flow rate air sample (not including field duplicate samples) – was also set up at locations surrounding the area chosen for the activity (see Appendix A, Figures 3 and 4). One ABS perimeter high flow rate and low flow rate air sample set (not including field duplicate samples) was positioned upwind of the activity area, and three sets of collocated ABS perimeter high flow rate and low flow rate air samples were positioned downwind of the activity area. As was stated in Section 3.0, variability and changes in wind direction and speed that occurred during the ABS air sampling rounds at the GAO 148 site may have caused upwind and downwind stationary air sampling locations to switch (or share) roles, effectively making the designations “upwind” and “downwind” ambiguous for the samples collected. For the two ABS air sampling rounds conducted within the large building complex on December 2, 2009, the structure's walls, machinery, and other materials, combined with the building's many openings to the outdoors, likely further influenced wind flow (speed and direction) as the outside wind entered the building's interior spaces.

A multi-point composite bulk material sample was collected in association with ABS air sampling Round 3, from within the area where the activity occurred after the round was completed. Bulk material samples were not collected in association with ABS air sampling Rounds 1 and 2. In addition, microvacuum dust

samples were not collected in association with any of the three ABS air sampling rounds conducted at the GAO 148 site.

Several deviations from specifications presented in the SAP (Ref. 1) were noted during the three ABS air sampling rounds conducted at the GAO 148 site. These deviations are as follows:

- The SAP specifies that each ABS air sampling round should occur over a minimum 120-minute period. In most ABS air sampling events, the participants conduct the chosen activity over the entire 120-minute duration without interruption. Reflecting recommendations made by EPA Environmental Response Team (ERT) personnel during an earlier sampling event at another site, however, it was decided that breaks in the sweeping activity would be introduced during ABS air sampling Round 2 conducted at the GAO 148 site. This was done in an effort to limit the amount of airborne dust produced during the sweeping activity, and therefore prevent overloading of the ABS backpack and ABS perimeter air samples collected. For ABS air sampling Round 2, sweeping was conducted for about 34 minutes at the beginning of the two-hour activity period and then sweeping was stopped for about 25 minutes; sweeping was then conducted intermittently during two more portions (for about 15 minutes and again for about 19 minutes) over the remainder of the two-hour round. Whenever the sweeping participant was not sweeping, however, she remained within the designated activity area with the pumps for ABS backpack high and low flow rate air samples continuing to run.
- The SAP specifies that during ABS air sampling events air samples should be collected from the breathing zones of the event participants. As stated earlier in this section, breathing zone samples (ABS backpack high and low flow rate air sample sets) were not collected during Round 1. This was because Round 1 did not include EPA and Tetra Tech START personnel conducting a simulated activity, and during the activity that did occur – where actual Palmetto Vermiculite, Inc. personnel conducted their own work activities – these personnel did not carry any air samples.
- The SAP specifies a minimum of four ABS perimeter air sampling locations – one upwind and three or more downwind – for each ABS air sampling round. This specification was met for all three ABS air sampling rounds conducted at the GAO 148 site. The SAP also specifies, however, that the ABS perimeter downwind air sampling locations be arrayed in a 180 degree arc downwind of the designated activity area. This specification was not strictly met during some of the ABS air sampling rounds conducted at the GAO 148 site. The arc formed by the downwind ABS perimeter air sampling locations were less than 180 degrees for ABS air sampling Rounds 2 and 3 (see Appendix A, Figures 3 and 4). For Round 2, this was due in part to restrictions on ABS perimeter air sample placement posed by walls, machinery, materials, and the general layout of the rooms within the building where the activity was conducted. For both Rounds 2 and 3, the positioning of ABS perimeter air sampling locations was based on a careful consideration of the observed wind direction and deviation from the 180-degree specification was likely inconsequential.
- The SAP specifies that after each ABS air sampling round, grab or multi-point composite bulk material or microvacuum dust samples will be collected from within the area where the activity occurred. As stated earlier in this section, neither bulk material samples nor microvacuum dust samples were collected from the activity areas for ABS air sampling Rounds 1 and 2. While a bulk material sample was planned for the activity area where ABS air sampling Round 2 occurred, the sample was not collected before leaving the GAO 148 site on the day Round 2 was

conducted. By the time on the following day when this bulk material sample was to be collected, the material swept during Round 2 had already been removed, re-spread, or otherwise obscured by ongoing operations at the facility so as to be considered unrepresentative of the material that was actually swept. As a result, it was decided that no bulk material sample be collected from the activity area for ABS air sampling Round 2.

- The SAP specifies that ABS air sampling should be conducted in accordance with EPA ERT standard operating procedure (SOP) No. 2084 (Ref. 4). Deviations from specifications presented in SOP No. 2084 that were noted during the ABS air sampling activities at the GAO 148 site are provided below:
 - SOP No. 2084 specifies that each ABS air sampling activity be conducted a minimum of three times in the same area to introduce variability in the conditions under which the activity is conducted and to expose trends. The SOP further states that this objective can be accomplished by either: a single participant repeating the simulated activity in the same area three or more times, or three or more participants simultaneously conducting the simulated activity in the area only once. This specification was not met for any of the ABS air sampling rounds conducted at the GAO 148 site. Instead, reflecting guidance provided by EPA ERT personnel who oversaw previous ABS air sampling events conducted at other sites, an ABS air sampling round was conducted only once on each of three separate areas at the GAO 148 site. For ABS air sampling Rounds 2 and 3, where EPA and Tetra Tech START personnel conducted simulated activities, no more than one participant at a time conducted the designated activity. For ABS air sampling Round 1, where a simulated activity was not conducted and instead actual Palmetto Vermiculite, Inc. personnel conducted their own work activities, there may at times have been more than one person working in the activity area at the same time, but no record was kept on the number of facility personnel simultaneously conducting work in the activity area during that round.
 - Twenty- to 28-inch-wide leaf rakes were specified for use during raking. The exact width of the rake that was used during the raking activity of ABS air sampling Round 3 at the GAO 148 site was not recorded, but its width was likely about 20 to 21 inches wide, within the lower end of the specified range. In addition, a garden rake was also used during ABS air sampling Round 3; the garden rake was likely less than 20 inches wide.
 - SOP No. 2084 specifies that a raking activity be conducted by raking from one side of the designated activity area for 15 minutes, turning 90 degrees clockwise and raking from the new side for 15 minutes, and continuing in a clockwise manner. During the one ABS air sampling round where raking was conducted (Round 3), the raking generally followed the SOP's raking pattern and sequence, although the time spent raking from each side may not have been 15 minutes and the rotational direction when moving from one side to the next may have been counterclockwise instead of clockwise.
 - SOP No. 2084 specifies that, for a raking activity, once several small piles of debris have been created from raking, the piles should be picked up and placed into a trash can. Debris piles were not picked up at all during the raking activity conducted for ABS air sampling Round 3 at the GAO 148 site. Instead, the debris piles were left on the ground. It is possible that during Round 3, whenever raked material was encountered piled up along an edge as a result of earlier raking, that material was raked back across the designated area to the opposite side (resulting in piled-up debris being raked across the designated activity area multiple times); this approach was used during simulated raking scenarios at other sites, but if it was used at GAO 148 site it was not documented.
 - SOP No. 2084 does not provide a procedure for sweeping. Sweeping was conducted during ABS air sampling Round 2 because the activity area for this round consisted of an area of concrete floor located inside the large building complex at the GAO 148 site. The

SAP provided a sweeping procedure as a supplement to the ERT SOP. This procedure specified that a participant sweep away from herself in a snaking "S" pattern. Instead of sweeping in an "S" pattern, the sweeping was conducted in the same way that the raking was conducted during ABS air sampling Round 3. Specifically, the participant swept from one side of the designated area to the other; then turned 90 degrees and swept from a new, adjacent side; and then continued in the same fashion. The activity participant may have swept away from herself, toward herself, or a combination of both. During Round 2, whenever swept material was encountered piled up along an edge as a result of earlier sweeping, that material was swept back across the designated area to the opposite side. As a result, piled-up debris was swept across the designated activity area multiple times. Further details and step-by-step descriptions of the procedures used for conducting the raking and sweeping during ABS air sampling Rounds 2 and 3 are included in the logbook notes and field sheets presented in Appendix C. The supplemental sweeping procedure provided in the SAP also specified that an 18- to 30-inch push broom be used for sweeping. The exact width of the push broom that was used was not recorded, but its width was likely about 24 inches wide, within the specified range.

- SOP No. 2084 specifies that the ABS perimeter high and low flow rate air sample sets be positioned at the site perimeter. This requirement was not followed for the ABS air sampling rounds conducted at the GAO 148 site. Instead, reflecting guidance provided by EPA ERT personnel who oversaw previous ABS air sampling rounds conducted at other sites, the ABS perimeter air sampling locations for each ABS round conducted at the GAO 148 site were positioned fairly close to their associated activity area in an array that roughly surrounded the activity area.

Sections 3.5.1, 3.5.2, and 3.5.3 discuss further details regarding ABS air sampling Rounds 1, 2, and 3 conducted at the GAO 148 site.

3.5.1 Activity-Based Sampling Round 1: Activities Conducted by Palmetto Vermiculite Personnel

On December 2, 2009, ABS air sampling Round 1 was conducted. As stated in Section 3.5, this ABS round did not include EPA and Tetra Tech START personnel conducting a simulated activity. Instead, this round focused on activities that were being conducted by personnel of Palmetto Vermiculite, Inc. These activities included bagging of materials and moving materials using a hand cart and a forklift. The activity area was located inside the central portion of the large building complex at the GAO 148 site, adjacent to the southeastern side of the structure (see Appendix A, Figure 3). This area was chosen for conducting ABS because it encompassed an area where Palmetto Vermiculite, Inc. personnel were observed to be working, which enabled collecting air samples in the proximity of actual work being conducted as opposed to a simulated activity. As stated in Section 3.4, the building complex had exterior walls that covered part but not all of the perimeter of the building complex. The area inside the building complex where ABS air sampling Round 1 was conducted was adjacent to an opening in the complex's exterior wall and was therefore susceptible to the influence of wind and weather to some degree.

Openings in exterior walls combined with the absence of interior walls in some places prevented the activity area from being isolated from either the outside or other adjoining interior spaces in the building complex. Other operations may have been occurring in other areas of the large building complex during ABS air sampling Round 1; these operations may have included moving material using a forklift and a mini-dozer (or front-end loader), and exfoliation of vermiculite. As a possible indication of the influence on the air inside the building complex from operations and activities that occurred at the Palmetto Vermiculite, Inc. facility, a photograph taken from within the activity area for ABS air sampling Round 1 shows light reflecting off particles suspended in the air (see Appendix D, Official Photo No. 2).

ABS air sampling Round 1 was conducted for 120 minutes. As stated in Section 3.5, because the Palmetto Vermiculite, Inc. personnel did not carry air samples during Round 1, breathing zone samples (ABS backpack high and low flow rate air sample sets) were not collected during Round 1. Four sets (plus an additional field duplicate sample set) of collocated ABS perimeter high flow rate and low flow rate air samples were placed around the activity area, with one set (with the field duplicates) designated as upwind and three sets designated as downwind (see Appendix A, Figure 3). Neither bulk material samples nor microvacuum dust samples were collected from within the activity area for ABS air sampling Round 1. The sample information for the ABS perimeter high flow rate and low flow rate air sample sets (plus their field duplicate sample set) associated with this ABS air sampling round is provided in Appendix B, Table 5. The laboratory analytical results for the air samples are presented in Appendix B, Table 6. The analytical results will be discussed later in this RAR.

3.5.2 Activity-Based Sampling Round 2: Sweeping

On December 2, 2009, ABS air sampling Round 2 was conducted and involved Tetra Tech START participants sweeping an area of concrete floor located inside the central portion of the large building complex at the GAO 148 site. The activity area was located adjacent to the northwestern side of the structure, amid hoppers and other machinery (see Appendix A, Figure 3). This area was chosen for conducting ABS because it was located near machinery and operations reportedly involved in processing and exfoliating vermiculite. In fact, during ABS air sampling Round 2, Palmetto Vermiculite, Inc. personnel used a small front-end loader to periodically transport and load material (possibly vermiculite concentrate) into hoppers that were located adjacent to the activity area (see Appendix A, Figure 3). As stated in Section 3.4, the building complex had exterior walls that covered part but not all of the perimeter of the building complex, which rendered parts of the interior of the building complex, including where ABS air sampling Round 2 occurred, susceptible to the influence of wind and weather to some degree.

Openings in exterior walls combined with the absence of interior walls in some places prevented the activity area from being isolated from either the outside or other adjoining interior spaces in the building complex. Other operations – such as the exfoliation of vermiculite and the transport of material on an elevated conveyor belt – were reportedly also occurring in the building complex during ABS air sampling Round 2. As a possible indication of the influence on the air inside the building complex from operations and activities that occurred at the Palmetto Vermiculite, Inc. facility, a photograph taken adjacent to the activity area for ABS air sampling Round 2 shows light reflecting off particles suspended in the air (see Appendix D, Official Photo No. 4).

ABS air sampling Round 2 was conducted for about 120 minutes, although – as stated in Section 3.5 – the sweeping activity occurred intermittently over three separate periods of the two-hour round in an effort to preclude overloading of the ABS backpack and perimeter air samples collected. Whether sweeping was occurring or not, however, all air sample pumps were left running during the entire two-hour sampling round, including the ABS backpack high flow rate and low flow rate air sample pumps. In addition, whenever the sweeping participant was not sweeping, she remained within the designated activity area. One set of collocated ABS backpack high flow rate and low flow rate air samples (plus a field duplicate sample accompanying the low flow rate sample) were collected using two participants, one sweeping before the other. Four sets of collocated ABS perimeter high flow rate and low flow rate air samples were placed around the activity area, with one set designated as upwind and three sets designated as downwind (see Appendix A, Figure 3). Neither bulk material samples nor microvacuum dust samples were collected from within the activity area for ABS air sampling Round 2. The sample information for the ABS backpack high flow rate and low flow rate air sample set (plus field duplicate) and the ABS perimeter high flow rate and low flow rate air sample sets associated with this ABS air sampling round is provided in Appendix B, Table 7. The laboratory analytical results for the air samples are presented in Appendix B, Table 8. The analytical results will be discussed later in this RAR.

3.5.3 Activity-Based Sampling Round 3: Raking

On December 3, 2009, ABS air sampling Round 3 was conducted and involved Tetra Tech START participants raking in a low area located in the northern portion of the GAO 148 site property, northwest of the large building complex at the site (see Appendix A, Figure 4). The activity area consisted of bare ground littered with gravel and debris and sparsely covered with low vegetation. This area was chosen to conduct an ABS round because it is a low area that appeared to receive surface water drainage from the large building complex and its immediate vicinity. A culvert with a ditch leading from it were located

nearby, west of the activity area chosen for ABS air sampling Round 3 (see Appendix A, Figure 4). Material that looked like vermiculite was observed within and on the ground surrounding the ditch (see Appendix D, Official Photographs Nos. 7 and 8). Operations such as the exfoliation of vermiculite were possibly also being conducted at the GAO 148 site during ABS air sampling Round 3.

ABS air sampling Round 3 was conducted for 120 minutes. Both a leaf rake and a garden rake were used to conduct the raking activity during the round. The leaf rake was used to rake from all four edges of the approximately square activity area, then the garden rake was used to conduct the next sequence of raking from the same four edges, then raking with the leaf rake was resumed, and so on in alternating fashion. One set of collocated ABS backpack high flow rate and low flow rate air samples were collected using two participants, one raking before the other. Four sets of collocated ABS perimeter high flow rate and low flow rate air samples were placed around the activity area, with one set designated as upwind and three sets designated as downwind (see Appendix A, Figure 4). At the end of ABS air sampling Round 3, a five-point composite bulk material sample (G148-AB3-B-35) was collected from within the area that was raked. The sample information for the ABS backpack high flow rate and low flow rate air sample set, the ABS perimeter high flow rate and low flow rate air sample sets, and the bulk material sample associated with this ABS air sampling round is provided in Appendix B, Table 9. The laboratory analytical results for the air samples are presented in Appendix B, Table 10, and the laboratory analytical results for the bulk material sample are presented in Appendix B, Table 11. The analytical results will be discussed later in this RAR.

3.6 ADDITIONAL BULK MATERIAL SAMPLING

Samples of bulk material not associated with a particular ABS air sampling round are designated as “additional” bulk material samples. As with any bulk material sample, additional bulk material samples may consist of debris, soil, VAI, starting or finished product associated with historical or current site operations, or a combination of these matrices. Four additional bulk material samples (G148-BS-31, G148-BS-32, G148-BS-33, and G148-BS-34) were collected on December 3, 2009 from locations within the large building complex at the GAO 148 site (see Appendix A, Figure 5). All four samples were grab samples collected from separate piles of what was reportedly concentrated vermiculite from various sources. Samples G148-BS-31 and G148-BS-32 were collected from piles that were located in separate covered storage bays along the southeastern side of the large building complex at the GAO 148 site. Samples G148-BS-33 and G148-BS-34 were collected from separate piles that were located at opposite ends of the same covered storage bay inside the northeastern end of the large building complex at the

GAO 148 site. Each of the four additional bulk material samples was collected using a stainless steel spoon that was used to dispense the material into an 8 ounce glass jar. The sample information for these additional bulk material samples is provided in Appendix B, Table 12, and the laboratory analytical results for the samples are presented in Appendix B, Table 13. The analytical results will be discussed later in this RAR.

3.7 FOLLOW-UP SITE VISIT ON MARCH 21, 2011

A follow-up site visit was made on March 21, 2011, with the purpose of inspecting the GAO 148 site to determine if the December 2009 sampling event had been sufficient; it had been almost 16 months since the December 2009 sampling event was conducted. Upon arrival at the GAO 148 site, EPA and Tetra Tech START met with the plant manager for Palmetto Vermiculite, Inc. and conducted a tour of the areas where the ABS air and bulk material sampling events were conducted in December 2009. After viewing the site and the sampling locations, the EPA OSC concluded that the activities of the December 2009 sampling event adequately addressed site conditions, and EPA and Tetra Tech departed the GAO 148 site shortly thereafter.

3.8 DISPOSAL OF INVESTIGATION-DERIVED WASTE

Various types of investigation-derived waste (IDW) were generated during the December 2009 field sampling event at the GAO 148 site. The IDW was secured on site because it was not known at the time of the field event whether asbestos was present at the site. The IDW generated during the December 2009 field event at the GAO 148 site and the means for securing it were as follows:

- Disposable materials such as latex and nitrile gloves, boot covers, protective suits, duct tape, plastic bags, spent breathing air cartridges, and paper towels. These materials were placed inside a plastic-bag-lined 55-gallon steel drum.
- Rinse water generated during decontamination. This water was minimal in volume and efforts were made to allow the water to evaporate while field activities were ongoing; any water remaining at the end of the field event was also placed inside the plastic-bag-lined 55-gallon steel drum.
- Backpacks used during two ABS air sampling rounds, and a broom head used during ABS air sampling Round 2. These items were not intended for reuse because of the potential for their exposure to asbestos and the expectation that they could not be adequately decontaminated for reuse. These items were placed inside the plastic-bag-lined 55-gallon steel drum.

The IDW was intended to be secured in these ways and left on site until the analytical results for the air and bulk material samples were received. If asbestos was not found to be present at detectable concentrations in these samples, the IDW was intended to be retrieved, decontaminated, and reused on subsequent sites or otherwise properly disposed of. If the analytical results for the air and bulk material samples indicated that asbestos existed at the site, the IDW might then require analysis and disposal according to applicable regulations. If, following analysis of the IDW, the analytical results revealed contamination at levels that required special handling, these wastes would then require disposal by a licensed transport and disposal firm. Up to three months were to be allowed to complete the IDW analytical profiling and procure a transport and disposal firm. In addition, the SAP (Ref. 1) specifies that, if in the best professional judgment of the Tetra Tech START field team leader and the EPA OSC, the IDW could be rendered nonhazardous, the IDW would be double-bagged and deposited in an industrial waste container.

Although the analytical results for the air and bulk material samples collected at the GAO 148 site have been received, indicating that detectable concentrations of asbestos were found in some of the samples, EPA has not yet made a determination regarding the final disposition of the IDW. Once a determination is made, the plastic-bag-lined 55-gallon steel drum containing the IDW that was left on site at the close of the December 2009 sampling event will be appropriately disposed of.

4.0 SAMPLE ANALYSIS

The samples collected during the December 2009 sampling event at the GAO 148 site were submitted for analysis to two laboratories: International Asbestos Testing Laboratories (IATL) located in Mt. Laurel, New Jersey, and Batta Environmental Associates Inc. (Batta) located in Newark, Delaware. The cooler containing the air samples shipped to Batta was reported by the laboratory to have been damaged during transport. The tape on one side of the cooler was almost completely removed (but still hanging onto the cooler's front) while the tape on the other side was intact but the custody seal beneath the tape was broken. Batta subsequently opened the cooler and found that the cooler's contents appeared to be in order and intact; the envelopes containing the air samples were still taped shut and the packing material inside the cooler appeared undisturbed. Batta indicated that the damage appeared to have been limited to the outside of the cooler. As a result of this inspection, it was concluded by both the EPA technical representative and Tetra Tech START that Batta should proceed with processing and analyzing the samples.

The laboratory analytical parameters, methods required for use in analyzing these samples, and other analytical specifications were presented in the documents: *Request for Analytical Services*, EPA Region 4 Superfund Division, June 18, 2009 (Ref. 9); and *Request for Analytical Services*, EPA Region 4 Superfund Division, November 2, 2009 (Ref. 10). If there were any variations in or additional technical instruction relating to the analytical methods used to analyze the samples collected at the GAO 148 site, those variations were specified in and communicated through the EPA laboratory assignments (Refs. 9 and 10). It is assumed that any additional variations were subsequently documented through EPA Region 4 communication records, the final laboratory reports, and the data validation reports. The laboratory analytical methods cited in the *Requests for Analytical Services* are:

- California Environmental Protection Agency, Air Resources Board (CARB) Method 435 (Ref. 7)
- American Society for Testing and Materials (ASTM) Method D4643-00 (Ref. 11)
- ASTM International Method ASTM D422-63 (2007) (Ref. 12)
- EPA Method EPA/600/R-04/004 (Ref. 8)
- ASTM Method ASTM D5755-95 (Ref. 6)
- International Organization for Standardization (ISO) Method ISO 10312: 1995 (Ref. 13)
- ISO Method ISO 13794: 1999 (Ref. 14)

The laboratory analytical data packages for the samples collected during the December 2009 sampling event at the GAO 148 site were not submitted directly to Tetra Tech START, but were instead submitted to the data validation contractor. Only after the data validation process was completed were the data provided to Tetra Tech START for incorporation into this RAR (although water content and particle size distribution data for one bulk material sample may have inadvertently not been validated – see Section 5.0 below). The laboratory data packages are presented in Attachment 3. The laboratory reported the analytical results for each air sample in the form of a National Asbestos Data Entry Spreadsheet (NADES), which is an electronic Microsoft Excel file that presents data in several tabs within the electronic file.

5.0 DATA VALIDATION

The laboratory analytical data generated from the analysis of the samples collected during the December 2009 field event were submitted for data validation as an initial step in determining acceptance of the data. Data validation was conducted by the Quality Assurance Technical Support Program contractor, the Shaw Group, Inc. (Shaw) according to the following procedures:

- Shaw Environmental, Inc., the Data Auditing Group, Quality Assurance Technical Support Program, Asbestos Data Validation Design (Ref. 15)

- Quality Assurance Technical Support Program, Standard Operating Procedure for the Verification and Validation of Polarized Light Microscopy (PLM) Data Deliverables, SOP QATS-70-090-00 (Ref. 16)
- Quality Assurance Technical Support Program, Standard Operating Procedure for the Verification and Validation of Transmission Electron Microscopy (TEM) Data Deliverables, SOP QATS-70-091-00 (Ref. 17)

Shaw prepared data validation reports that present qualifications to the data (if any) and the reasons for the qualifications. These reports are presented in Attachment 1. The data validation reports include scanned versions of the laboratory analytical result sheets with hand-written data qualifiers – if any – applied as a result of the data validation process. A review of the reports indicates that the water content and particle size distribution data for one bulk material sample collected during the field event (sample G148-AB3-B-35) may have inadvertently not been validated. Except for those analytical parameters for sample G148-AB3-B-35, all of the data for the December 2009 field event presented in this RAR (either in the text, the data tables in Appendix B, or in other portions – with the exception of Attachment 3) include these data qualifiers.

6.0 PRESENTATION OF ANALYTICAL RESULTS

This section presents and discusses the meteorological monitoring data gathered during the field event as well as the laboratory analytical data for the air and bulk material samples collected during the field event conducted at the GAO 148 site on December 2 and 3, 2009. The validated laboratory data for the samples collected during the December 2009 sampling event are presented in Appendix B, Tables 2, 4, 6, 8, 10, 11 and 13. As noted in Section 5.0, a portion of the results for sample G148-AB3-B-35, which are presented in Table 11, may be unvalidated. The air sample data presented in these tables were taken from the data tab within the sample's NADES Excel file titled "NADES Report." Furthermore, only the "Phase Contrast Microscopy (PCM) Equivalent Structures (PCME)" portion of the "NADES Report" data tab was transcribed into the Appendix B data tables for this RAR, and these are the only air sample data discussed in this report.

6.1 METEOROLOGICAL MONITORING DATA

As discussed in section 3.1, Tetra Tech START supplied a portable meteorological station for use during ABS activities at the GAO 148 site to measure wind speed, wind direction, temperature, and other meteorological parameters in real time. The meteorological station's data were stored for later retrieval and use in evaluating the laboratory data from the analysis of the samples. The meteorological station was used at the site during the ABS-related field events on December 2 and 3, 2009. A malfunction of

the meteorological station occurred during both days, however, which interrupted continuous logging of some meteorological parameters during the air sampling activities that were conducted. Therefore, the data for some meteorological parameters may not be available for some time periods over which the air sampling activities were occurring on those days.

On December 2, 2009, the meteorological station was positioned northeast of the large building complex at the GAO 148 site, near the site's property boundary (see Appendix A, Figures 3). This location was chosen because it was considered – based on the observed wind direction at the beginning of the day – to have been relatively free from the influence of buildings, trees, and other structures that might have prevented accurate measurement of general weather conditions at the GAO 148 site, such as wind direction and speed. On December 3, 2009, the meteorological station was positioned northwest of the large building complex, within the GAO 148 site property boundary (see Appendix A, Figures 4). This location was also chosen because it was relatively far from buildings, trees, and other structures that might have prevented accurate measurement of general weather conditions at the GAO 148 site. Despite efforts to isolate the meteorological station from local influences on weather conditions, the weather data – in particular wind speed and direction – recorded over the course of the December 2009 sampling event may have at times nonetheless been influenced by obstructions as the wind shifted over the course of the measurement periods.

The data recorded on December 2 and 3, 2009 by the on-site meteorological station are presented in Attachment 2. In addition, some personal observations of the weather, including wind direction and relative wind speed, made by field personnel while field activities were underway were recorded in the logbook notes (Appendix C). A summary of weather conditions and data recorded for the time periods over which the ABS air sampling activities occurred on those two days is not presented here; collected weather data relevant to specific sets of air samples, however, are discussed in some sections of this RAR wherein the data for those samples are presented.

6.2 FIELD QUALITY CONTROL SAMPLE RESULTS

As discussed in Section 3.2, two lot blanks (G148-LOT-08-36 and G148-LOT-08-37) and two field blanks (G148-FB-08-38 and G148-FB-08-39) associated with the air samples were collected and submitted to the laboratory for analysis (see Appendix B, Table 1). The laboratory analytical results for these samples are presented in Appendix B, Table 2. The table shows that no structures were detected in any of the lot blanks and field blanks for all PCME structures listed.

Field duplicate samples were collected only for ABS perimeter upwind high flow rate air samples, ABS perimeter upwind low flow rate air samples, and ABS backpack low flow rate air samples. A field duplicate sample for each of the two samples in one set of ABS perimeter upwind high flow rate and low flow rate air samples was collected during ABS air sampling Round 1 on December 2, 2009. Appendix B, Table 5 lists the two field duplicate sample pairs: G148-AB1-PH-01 with G148-AB1-PH-01-DUP, and G148-AB1-PL-02 with G148-AB1-PL-02-DUP. Thus, two sets of collocated high flow rate and low flow rate air samples were collected at the same time and location. The laboratory analytical protocol for collocated high flow rate and low flow rate air sample sets directed the laboratory to: (1) first attempt to analyze the high flow rate (high volume) air sample using direct analysis, and, if that sample was overloaded, then (2) proceed to analyze the low flow rate (low volume) air sample by direct analysis. If both the high volume and the low volume air samples in a given collocated set were overloaded, then the laboratory was to subject either the high volume air sample or the low volume air sample to indirect analysis (with EPA Region 4 approval). In accordance with this analytical protocol, only one sample in each of the two collocated high flow rate and low flow rate air sample sets was analyzed by the laboratory. In this case both of the ABS perimeter upwind low flow rate air samples (G148-AB1-PL-02 and its field duplicate, G148-AB1-PL-02-DUP) were analyzed by direct analysis, and neither of the ABS perimeter upwind high flow rate air samples was analyzed. Appendix B, Table 6 presents the analytical results for the ABS perimeter upwind low flow rate field duplicate air sample pair (G148-AB1-PL-02 and G148-AB1-PL-02-DUP). The table shows that the analytical results for the two samples agree in terms of the PCME structures that were detected in them, but differ to varying degrees in the concentrations reported for each structure. The results for sample G148-AB1-PL-02 show positive PCME results for total asbestos (2.3E-02 structures per cubic centimeter [s/cc]), total amphibole (2.3E-02 s/cc), actinolite (1.1E-02 s/cc), and Libby amphibole (1.2E-02 s/cc). The results for field duplicate sample G148-AB1-PL-02-DUP show positive PCME results for total asbestos (1.9E-02 s/cc), total amphibole (1.9E-02 s/cc), actinolite (2.0E-03 s/cc), and Libby amphibole (1.7E-02 s/cc).

A field duplicate sample for the low flow rate air sample in the ABS backpack high flow rate and low flow rate air sample set was collected during ABS air sampling Round 2 on December 2, 2009. Appendix B, Table 7 lists the field duplicate sample pair: G148-AB2-AL-18 and G148-AB2-AL-18-DUP. As stated above, in accordance with the analytical protocol used for collocated high flow rate and low flow rate air sample sets, only one sample in each collocated high flow rate and low flow rate air sample set was analyzed by the laboratory. During ABS air sampling Round 2, when the ABS backpack low flow rate field duplicate air sample pair was collected, no accompanying field duplicate air sample was

collected for the collocated ABS backpack high flow rate air sample. Therefore, only one of the two samples in the collocated high flow rate and low flow rate ABS backpack air sample set was assigned to have a field duplicate sample collected. As a result, there was a chance that the field duplicate samples would not be analyzed under the laboratory analytical protocol. The laboratory actually analyzed both samples from the ABS backpack low flow rate field duplicate air sample pair. Realizing, however, that the laboratory may not have analyzed one or both of the samples in the field duplicate sample pair led to a revised approach for future projects, which calls for collecting duplicate sample pairs for both samples in a collocated high flow rate and low flow rate air sample set. Appendix B, Table 8 presents the analytical results for the ABS backpack low flow rate field duplicate air sample pair (G148-AB2-AL-18 and G148-AB2-AL-18-DUP). The table shows that the analytical results for the two samples differ. The results for sample G148-AB2-AL-18 show nondetects for all PCME structure listed. In contrast, the results for sample G148-AB2-AL-18-DUP shows positive PCME results for total asbestos (4.0E-03 s/cc), total amphibole (4.0E-03 s/cc), anthophyllite (9.9E-04 s/cc), and Libby amphibole (3.0E-03 s/cc). The differences in the results for these two samples may be due in part to the fact that, as Table 8 shows, sample G148-AB2-AL-18 was analyzed by indirect analysis while sample G148-AB2-AL-18-DUP was analyzed by direct analysis.

6.3 BACKGROUND AIR SAMPLE RESULTS

As stated in Section 3.3, background air samples were collected on only one of the two days of sampling during the December 2009 field event at the GAO 148 site. On December 2, 2009 background air sampling was not conducted due to the occurrence of heavy rain. Appendix B, Table 4 presents the analytical results for background air sample G148-BKA-19, collected on December 3, 2009 (see Appendix A, Figure 4; and Appendix B, Table 3). The analytical results for background air sample G148-BKA-19 show nondetects for all PCME structures listed.

The SAP (Ref. 1) specifies that, to the degree possible, the location selected for the background air samples should be free of known asbestos contamination. The background air asbestos level should reflect the concentration of asbestos in the air for the environmental setting in the vicinity of the site and will be used to help evaluate whether a release from the site occurred during the field event. The background air asbestos level does not necessarily represent historical, pre-release conditions or conditions in the absence of influence from potential sources at the site. A background air asbestos level may or may not be less than the analytical detection limit, and if it is greater than the detection limit (and therefore detectable), it will account for variability in local asbestos air concentrations (Ref. 4). The

analytical results for the background air sample collected at the GAO 148 site on December 3, 2009 – showing nondetects for all PCME structures listed - indicate that the background air sampling location on that day was free of detectable asbestos contamination while the pump was operating for this background air sample.

6.4 AGGRESSIVE AIR AND BULK MATERIAL SAMPLE RESULTS

As stated in Section 3.4, no indoor aggressive air sampling (and associated bulk material sampling) activities were conducted at the GAO 148 site. Refer to Section 6.5, however, for a presentation of the sample results for the two ABS air sampling rounds that were conducted at separate locations inside the site's building complex.

6.5 ACTIVITY-BASED AIR AND BULK MATERIAL SAMPLE RESULTS

Sections 6.5.1, 6.5.2, and 6.5.3 present the laboratory analytical data for the air and bulk material samples collected during the three ABS air sampling rounds conducted at the GAO 148 site on December 2 and 3, 2009.

6.5.1 Activity-Based Sampling Round 1: Activities Conducted by Palmetto Vermiculite Personnel

Four sets of collocated ABS perimeter high flow rate and low flow rate air samples (plus an additional field duplicate sample set at the position designated as upwind) were collected during ABS air sampling Round 1 (see Appendix A, Figure 3). This round focused on activities (bagging of materials and moving materials using a hand cart and a forklift) that were being conducted by personnel of Palmetto Vermiculite, Inc. Other operations, such as moving material using the forklift and a mini-dozer (or front-end loader) and exfoliation of vermiculite, may have also been occurring in other areas of the large building complex during ABS air sampling Round 1. Appendix B, Table 6 presents the laboratory analytical results for the air samples. As stated in Section 3.5.1, ABS backpack high and low flow rate air samples, bulk material samples, and microvacuum dust samples were not collected in association with ABS air sampling Round 1.

As indicated in Section 6.2, the laboratory analytical protocol for analyzing collocated high flow rate (high volume) and low flow rate (low volume) air sample sets causes the analytical results for only one of the two samples in the high and low volume set to be reported. As a result, Appendix B, Table 6 presents

results for only five of the ten ABS perimeter air samples that were collected during ABS air sampling Round 1; all of the analyzed samples were low volume samples. Two of the samples were analyzed by direct analysis and three of the samples were analyzed by indirect analysis.

The results for all five of the ABS perimeter air samples show positive PCME results for asbestos (see Appendix B, Table 6). The results for sample G148-AB1-PL-02 show positive PCME results for total asbestos (2.3E-02 s/cc), total amphibole (2.3E-02 s/cc), actinolite (1.1E-02 s/cc), and Libby amphibole (1.2E-02 s/cc). The results for field duplicate sample G148-AB1-PL-02-DUP show positive PCME results for total asbestos (1.9E-02 s/cc), total amphibole (1.9E-02 s/cc), actinolite (2.0E-03 s/cc), and Libby amphibole (1.7E-02 s/cc). The results for sample G148-AB1-PL-04 show positive PCME results for total asbestos (3.9E-03 s/cc), total amphibole (3.9E-03 s/cc), anthophyllite (9.7E-04 s/cc), and Libby amphibole (2.9E-03 s/cc). The results for sample G148-AB1-PL-06 show positive PCME results for total asbestos (4.9E-03 s/cc), total amphibole (4.9E-03 s/cc), actinolite (3.0E-03 s/cc), and Libby amphibole (2.0E-03 s/cc). Finally, the results for sample G148-AB1-PL-08 show positive PCME results for total asbestos (3.3E-02 s/cc), total amphibole (3.3E-02 s/cc), actinolite (3.2E-02 s/cc), and Libby amphibole (9.8E-04 s/cc).

Recorded wind speeds during ABS air sampling Round 1 varied from 0 to 10 miles per hour (see Attachment 2). When winds above 0 miles per hour were recorded during ABS air sampling Round 1, the measured wind direction was variable, but blew predominantly from the north to the east-northeast. As stated in Section 3.5.1, the area inside the large building complex where ABS air sampling Round 1 was conducted was adjacent to an opening in the large building complex's exterior wall and was therefore susceptible to the influence of wind and weather to some degree. The ABS Round 1 perimeter air samples that were designated as upwind and downwind were therefore appropriately positioned relative to the dominant wind directions that manifested over the course of the round (see Appendix A, Figure 3 and Appendix B, Table 6). However, because ABS air sampling Round 1 was conducted within the building complex, it is difficult to determine the influence the building's exterior and interior walls, machinery, and other structures had on the speed and direction of the wind after it entered the building complex and passed through the activity area. This uncertainty in wind direction and speed within the activity area during ABS air sampling Round 1 hinders a clear explanation of the occurrence of positive asbestos results reported for both upwind and downwind ABS perimeter air samples.

6.5.2 Activity-Based Sampling Round 2: Sweeping

One set of collocated ABS backpack high flow rate and low flow rate air samples (plus a field duplicate sample accompanying the low flow rate sample) and four sets of collocated ABS perimeter high flow rate and low flow rate air samples were collected during ABS air sampling Round 2 (see Appendix A, Figure 3). While this round involved a simulated sweeping activity, other operations were occurring during the round, including Palmetto Vermiculite, Inc. personnel using a small front-end loader to periodically transport and load material (possibly vermiculite concentrate) into hoppers that were located adjacent to the activity area. In addition, the exfoliation of vermiculite and the transport of material on an elevated conveyor belt were reportedly also occurring in the large building complex during ABS air sampling Round 2. Appendix B, Table 8 presents the laboratory analytical results for the air samples. As stated in Section 3.5.2, bulk material samples and microvacuum dust samples were not collected in association with ABS air sampling Round 2.

As indicated in Section 6.2, the laboratory analytical protocol for analyzing collocated high flow rate (high volume) and low flow rate (low volume) air sample sets causes the analytical results for only one of the two samples in the high and low volume set to be reported. As a result, Appendix B, Table 8 presents results for only six of the eleven ABS backpack and ABS perimeter air samples that were collected during ABS air sampling Round 2. Of these six samples analyzed, all were low volume samples; one of the samples was analyzed by indirect analysis and five samples were analyzed by direct analysis.

The results for ABS backpack low volume sample G148-AB2-AL-18 show nondetects for all PCME structures listed (see Appendix B, Table 8). In contrast, the results for ABS backpack field duplicate sample G148-AB2-AL-18-DUP show positive PCME results for total asbestos (4.0E-03 s/cc), total amphibole (4.0E-03 s/cc), anthophyllite (9.9E-04 s/cc), and Libby amphibole (3.0E-03 s/cc).

Of the four ABS perimeter upwind and downwind low volume air samples that were analyzed, the results for one air sample designated as downwind (G148-AB2-PL-14) show nondetects for all PCME structures listed (see Appendix B, Table 8). The results for the three remaining ABS perimeter upwind and downwind air samples that were analyzed (G148-AB2-PL-10, G148-AB2-PL-12, and G148-AB2-PL-16) show positive PCME results. The results for sample G148-AB2-PL-10 show positive PCME results for total asbestos (4.0E-03 s/cc), total amphibole (4.0E-03 s/cc), actinolite (2.0E-03 s/cc), anthophyllite (9.9E-04 s/cc), and Libby amphibole (9.9E-04 s/cc). The results for sample G148-AB2-PL-12 show positive PCME results for total asbestos (1.0E-02 s/cc), total amphibole (1.0E-02 s/cc), actinolite (1.0E-

03 s/cc), anthophyllite (1.0E-03 s/cc), and Libby amphibole (8.0E-03 s/cc). Finally, the results for sample G148-AB2-PL-16 show positive PCME results for total asbestos (7.7E-03 s/cc), total amphibole (7.7E-03 s/cc), actinolite (9.7E-04 s/cc), and Libby amphibole (6.8E-03 s/cc).

Recorded wind speeds during ABS air sampling Round 2 varied from 0 to 13 miles per hour (see Attachment 2). When winds above 0 miles per hour were recorded during ABS air sampling Round 2, the measured wind direction was variable but blew a significant amount of the time from the north-northeast to the east-northeast. Winds were also measured coming out of other directions, however, including from the northwest to west and even briefly from the south-southwest. As stated in Section 3.5.2, the building complex had exterior walls that covered part but not all of the perimeter of the building complex, which rendered parts of the interior of the building complex, including where ABS air sampling Round 2 occurred, susceptible to the influence of wind and weather to some degree. The ABS Round 2 perimeter air samples that were designated as upwind and downwind were therefore appropriately positioned relative to the dominant arc of wind directions that manifested over the course of the round (see Appendix A, Figure 3 and Appendix B, Table 8). However, because ABS air sampling Round 2 was conducted within the building complex, it is difficult to determine the influence the building's exterior and interior walls, machinery, and other structures had on the speed and direction of the wind after it entered the building complex and passed through the activity area where air sampling occurred. This uncertainty in wind direction and speed within the activity area during ABS air sampling Round 2 hinders a clear explanation of the occurrence of positive asbestos results reported for both upwind and downwind ABS perimeter air samples.

6.5.3 Activity-Based Sampling Round 3: Raking

One set of collocated ABS backpack high flow rate and low flow rate air samples and four sets of collocated ABS perimeter high flow rate and low flow rate air samples were collected during ABS air sampling Round 3 (see Appendix A, Figure 4). While this round involved a simulated raking activity, other operations were also being conducted during the round in other areas of the GAO 148 site, possibly including the exfoliation of vermiculite. Appendix B, Table 10 presents the laboratory analytical results for the air samples. In addition, a five-point composite bulk material sample (G148-AB3-B-35) was collected from within the activity area after completion of ABS air sampling Round 3. The laboratory analytical results for the bulk material sample are presented in Appendix B, Table 11.

As indicated in Section 6.2, the laboratory analytical protocol for analyzing collocated high flow rate (high volume) and low flow rate (low volume) air sample sets causes the analytical results for only one of the two samples in the high and low volume set to be reported. As a result, Appendix B, Table 10 presents results for only five of the ten ABS backpack and ABS perimeter air samples that were collected during ABS air sampling Round 3. All five samples were high volume samples analyzed by direct analysis.

The results for the ABS backpack high volume air sample that was analyzed (G148-AB3-AH-28) show nondetects for all PCME structures listed (see Appendix B, Table 10).

The results for all four of the ABS perimeter upwind and downwind high volume air samples that were analyzed show nondetects for all PCME structures listed (see Appendix B, Table 10). No measurable wind speeds (above 0 miles per hour) were recorded during ABS air sampling Round 3 (see Attachment 2).

The results for bulk material sample G148-AB3-B-35 (Appendix B, Table 11) indicate that asbestos was not detected. The nondetect asbestos results for this sample are consistent with the nondetect asbestos results for the air samples collected during ABS air sampling Round 3. Note that data validation may have inadvertently not been conducted on the water content and particle size distribution data for this bulk material sample.

6.6 ADDITIONAL BULK MATERIAL SAMPLE RESULTS

As stated in Section 3.6, four additional bulk material samples (G148-BS-31, G148-BS-32, G148-BS-33, and G148-BS-34) were collected on December 3, 2009 from locations within the large building complex at the GAO 148 site (see Appendix A, Figure 5). All four samples were grab samples taken from separate piles of what was reportedly concentrated vermiculite from various sources. While all four samples were analyzed for asbestos using PLM analysis, three of the samples (G148-BS-31, G148-BS-32, and G148-BS-33) were also analyzed for asbestos using TEM analysis. The PLM results for the four bulk material samples (Appendix B, Table 13) indicate that asbestos was not detected. In addition, the TEM results for bulk material samples G148-BS-31, G148-BS-32, and G148-BS-33 (Appendix B, Table 13) also indicate that asbestos was not detected. Non-fibrous materials of the types “SiAlMg M+”, “K, Potassium Matrix”, and “Fe, Iron Oxide” were identified in all three samples analyzed using TEM analysis.

7.0 RECONCILIATION OF THE DATA TO PROJECT-SPECIFIC DATA QUALITY OBJECTIVES

A malfunction of the meteorological station occurring during both days of the December 2009 field sampling event interrupted continuous logging of some meteorological parameters during the air sampling activities that were conducted. Field duplicate samples were not collected for the following sample matrices: background air samples, ABS backpack high flow rate air samples, ABS perimeter downwind high flow rate air samples, ABS perimeter downwind low flow rate air samples, ABS bulk material samples, and additional bulk material samples. A background air sample was collected only on the second day (December 3, 2009) of the field event at the GAO 148 site; on the first day (December 2, 2009), background air sampling was not conducted due to the occurrence of heavy rain. No indoor aggressive air sampling (and associated bulk material sampling) activities were conducted at the GAO 148 site due to site conditions. In addition, neither bulk material samples nor microvacuum dust samples were collected in association with ABS air sampling Rounds 1 and 2. The tape and custody seals on a cooler containing the air samples shipped to one of the laboratories (Batta) were reported by the laboratory to have been damaged during transport. Because the damage appeared to have been limited to the outside of the cooler, it was concluded by both the EPA technical representative and Tetra Tech START that the laboratory should proceed with processing and analyzing the samples. Aside from these and the other deviations and discrepancies (relative to the SAP [Ref. 1] and other guidance documents cited therein) discussed in this RAR, the sampling at the GAO 148 site and the laboratory analyses of the samples generally achieved the goals set forth for the investigation. The data validation conducted on the laboratory data packages did not result in rejection of any of the laboratory data. Note, however, that data validation may have inadvertently not been conducted on the water content and particle size distribution data for one bulk material sample collected during the field event. The EPA OSC is responsible for determining the impact of any data qualifications and limitations on data usability; the ultimate acceptance of the data is at EPA's discretion. Additional information on the project DQOs is provided in the site-specific quality assurance project plan (QAPP) presented in the SAP.

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APPENDIX A

FIGURES


(Five Pages)

FIGURE

- 1 SITE LOCATION
- 2 SITE LAYOUT
- 3 SAMPLE LOCATIONS FOR ACTIVITY-BASED AIR SAMPLING ROUNDS 1 & 2, DECEMBER 2, 2009
- 4 SAMPLE LOCATIONS FOR ACTIVITY-BASED AIR SAMPLING ROUND 3, DECEMBER 3, 2009
- 5 ADDITIONAL BULK MATERIAL SAMPLING, DECEMBER 3, 2009



Legend

 Approximate Property Boundary



0 1,000 2,000
Feet

Map Source:
USGS Topographic Quadrangle Maps,
Woodruff, SC 1984 & Enoree, SC 1973



United States
Environmental Protection Agency

VERMICULITE EXFOLIATION SITE
GAO 148
WOODRUFF,
SPARTANBURG COUNTY,
SOUTH CAROLINA
TDD No. TTEMI-05-003-0078

**FIGURE 1
SITE LOCATION**





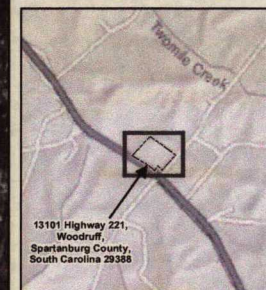
Legend

Approximate Property Boundary



0 37.5 75 150 Feet

Map Source:
Aerial Imagery - ESRI I3 Imagery Prime, 2009



United States
Environmental Protection Agency

VERMICULITE EXFOLIATION SITE
GAO 148
WOODRUFF,
SPARTANBURG COUNTY,
SOUTH CAROLINA
TDD No. TTEMI-05-003-0078

FIGURE 2
SITE LAYOUT

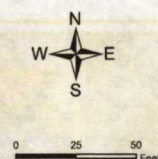
TETRA TECH





Legend

- Station Identification
- Sample Designation
- Bulk Sample Point
- Piles
- Approximate Property Boundary
- Approximate Wall Locations



Map Source:
Aerial Imagery - ESRI I3 Imagery Prime, 2009



United States
Environmental Protection Agency

VERMICULITE EXFOLIATION SITE
GAO 148
WOODRUFF,
SPARTANBURG COUNTY,
SOUTH CAROLINA
TDD No. TTEMI-05-003-0078

FIGURE 5
ADDITIONAL BULK MATERIAL
SAMPLING
DECEMBER 3, 2009

TETRA TECH

APPENDIX B

TABLES

(13 Pages)

TABLE

- 1 LOT AND FIELD BLANK SAMPLES
- 2 ANALYTICAL RESULTS FOR LOT AND FIELD BLANK SAMPLES
- 3 BACKGROUND AIR SAMPLE
- 4 ANALYTICAL RESULTS FOR THE BACKGROUND AIR SAMPLE
- 5 ACTIVITY-BASED AIR SAMPLES: ROUND 1, ACTIVITIES CONDUCTED BY PALMETTO VERMICULITE PERSONNEL
- 6 ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 1, ACTIVITIES CONDUCTED BY PALMETTO VERMICULITE PERSONNEL
- 7 ACTIVITY-BASED AIR SAMPLES: ROUND 2, SWEEPING
- 8 ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 2, SWEEPING
- 9 ACTIVITY-BASED AIR SAMPLES: ROUND 3, RAKING
- 10 ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 3, RAKING
- 11 ANALYTICAL RESULTS FOR THE BULK MATERIAL SAMPLE COLLECTED FOR ACTIVITY-BASED: ROUND 3, RAKING
- 12 ADDITIONAL BULK MATERIAL SAMPLES
- 13 ANALYTICAL RESULTS FOR ADDITIONAL BULK MATERIAL SAMPLES

TABLE 1
LOT AND FIELD BLANK SAMPLES

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 3, 2009	G148LOT22	G148-LOT-08-36	56184	Lot Blank for 0.8 µm filter cassettes	NA	NA
December 3, 2009	G148LOT23	G148-LOT-08-37	56185	Lot Blank for 0.8 µm filter cassettes	NA	NA
December 3, 2009	G148FB24	G148-FB-08-38	56186	Field Blank for 0.8 µm filter cassettes	NA	NA
December 3, 2009	G148FB25	G148-FB-08-39	56187	Field Blank for 0.8 µm filter cassettes	NA	NA

Notes:

BOLD = Samples in BOLD type indicate those samples that were analyzed by the laboratory.

FB = Field blank

FB-08 = Field blank for 0.8-µm MCE membrane filter cassettes

G148 = Vermiculite exfoliation site GAO 148

LOT = Lot blank

LOT-08 = Lot blank for 0.8-µm MCE membrane filter cassettes

MCE = Mixed cellulose ester

µm = Micrometer

NA = Not applicable

TABLE 2
ANALYTICAL RESULTS FOR LOT AND FIELD BLANK SAMPLES

Sample Number:	56184			56185			56186			56187		
Sample Designation:	G148-LOT-08-36			G148-LOT-08-37			G148-FB-08-38			G148-FB-08-39		
Station Identification:	G148LOT22			G148LOT23			G148FB24			G148FB25		
Sample Description:	Lot Blank for 0.8 µm filter cassettes			Lot Blank for 0.8 µm filter cassettes			Field Blank for 0.8 µm filter cassettes			Field Blank for 0.8 µm filter cassettes		
Sample Collection Date:	12/3/2009			12/3/2009			12/3/2009			12/3/2009		
Air Volume Sampled (liters):	NA			NA			NA			NA		
Sample Preparation:	Direct			Direct			Direct			Direct		
Sensitivity:	Blank			Blank			Blank			Blank		
PCM Equivalent Structures (PCME)	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual
Total Asbestos	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
Total Chrysotile (CH)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
Total Amphibole	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
actinolite (AC)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
amosite (AM)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
anthophyllite (AN)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
crocidolite (CR)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
tremolite (TR)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
Libby amphibole (LA)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
other amphibole (OA)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
other mineral class (OM)	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
Solid Soln: Amosite	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	
Solid Soln: Trem-Act	Blank	Blank	- Blank		Blank	Blank	- Blank		Blank	Blank	- Blank	

Notes:

% = Percent

blank = No structures were detected in the blank.

BOLD = Results for "Air Conc (s/cc)" represented in BOLD type indicate positive values

Conc = Concentration

FB = Field blank

FB-08 = Field blank for 0.8-µm MCE membrane filter cassettes

G148 = Vermiculite exfoliation site GAO 148

LOT = Lot blank

LOT-08 = Lot blank for 0.8-µm MCE membrane filter cassettes

MCE = Mixed cellulose ester

µm = Micrometer

NA = Not applicable

PCM = Phase Contrast Microscopy

Qual = Qualifier

s/cc = Structures per cubic centimeter

Soln = Solution

BOLD = Samples in BOLD type indicate those samples that were analyzed by the laboratory.

BKA = Background air sample

G148 = Vermiculite exfoliation site GAO 148

TABLE 4
ANALYTICAL RESULTS FOR THE BACKGROUND AIR SAMPLE

Sample Number:	56209			
Sample Designation:	G148-BKA-19			
Station Identification:	G148BKA10			
Sample Description:	Background air			
Sample Collection Date:	12/3/2009			
Air Volume Sampled (liters):	1,572.80			
Sample Preparation:	Direct			
Sensitivity (s/cc):	1.0E-04			
PCM Equivalent Structures (PCME)	Air Conc (s/cc)	90% Confidence Interval		Data Qual
Total Asbestos	0.0E+00	0.0E+00	- 3.0E-04	U
Total Chrysotile (CH)	0.0E+00	0.0E+00	- 3.0E-04	U
Total Amphibole	0.0E+00	0.0E+00	- 3.0E-04	U
actinolite (AC)	0.0E+00	0.0E+00	- 3.0E-04	U
amosite (AM)	0.0E+00	0.0E+00	- 3.0E-04	U
anthophyllite (AN)	0.0E+00	0.0E+00	- 3.0E-04	U
crocidolite (CR)	0.0E+00	0.0E+00	- 3.0E-04	U
tremolite (TR)	0.0E+00	0.0E+00	- 3.0E-04	U
Libby amphibole (LA)	0.0E+00	0.0E+00	- 3.0E-04	U
other amphibole (OA)	0.0E+00	0.0E+00	- 3.0E-04	U
other mineral class (OM)	0.0E+00	0.0E+00	- 3.0E-04	U
Solid Soln: Amosite	0.0E+00	0.0E+00	- 3.0E-04	U
Solid Soln: Trem-Act	0.0E+00	0.0E+00	- 3.0E-04	U

Notes:

$x.x E \pm yy = x.x$ multiplied times 10 raised to the yy power

% = Percent

BOLD = Results for "Air Conc (s/cc)" represented in

BOLD type indicate positive values

BKA = Background air sample

Conc = Concentration

G148 = Vermiculite exfoliation site GAO 148

PCM = Phase Contrast Microscopy

Qual = Qualifier

s/cc = Structures per cubic centimeter

Soln = Solution

U = The analyte was analyzed for, but was not detected above the level of the reported sensitivity.

TABLE 5
ACTIVITY-BASED AIR SAMPLES: ROUND 1, ACTIVITIES CONDUCTED BY PALMETTO VERMICULITE PERSONNEL

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 2, 2009	G148AB101	G148-AB1-PH-01	56188	ABS: Perimeter Upwind, High Volume Sample.	120	1,197.60
December 2, 2009	G148AB101	G148-AB1-PH-01-DUP	56189	ABS: Perimeter Upwind, High Volume Sample. Field duplicate sample of 56188.	120	1,188.60
December 2, 2009	G148AB101	G148-AB1-PL-02	56190	ABS: Perimeter Upwind, Low Volume Sample. Filter may have been damaged after sampling when the cassette was momentarily pulled slightly apart during handling.	120	352.80
December 2, 2009	G148AB101	G148-AB1-PL-02-DUP	56191	ABS: Perimeter Upwind, Low Volume Sample. Field duplicate sample of 56190.	120	354.60
December 2, 2009	G148AB102	G148-AB1-PH-03	56192	ABS: Perimeter Downwind, High Volume Sample.	120	1,194.60
December 2, 2009	G148AB102	G148-AB1-PL-04	56193	ABS: Perimeter Downwind, Low Volume Sample.	120	353.40
December 2, 2009	G148AB103	G148-AB1-PH-05	56194	ABS: Perimeter Downwind, High Volume Sample.	120	1,194.60
December 2, 2009	G148AB103	G148-AB1-PL-06	56195	ABS: Perimeter Downwind, Low Volume Sample.	120	351.00
December 2, 2009	G148AB104	G148-AB1-PH-07	56196	ABS: Perimeter Downwind, High Volume Sample.	120	1,188.60
December 2, 2009	G148AB104	G148-AB1-PL-08	56197	ABS: Perimeter Downwind, Low Volume Sample.	120	351.00

BULK MATERIAL SAMPLES FOR ACTIVITY-BASED: ROUND 1, ACTIVITIES CONDUCTED BY PALMETTO VERMICULITE PERSONNEL

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
NA	NA	NA	NA	NA	NA	NA

Notes:

- Adjacent rows that share the same highlighted color (yellow or green) indicate collocated air sample sets. A sample set consists of a high-volume air sample and a low-volume air sample (sometimes with a collocated field duplicate sample for one or both).
- BOLD** = Samples in BOLD type indicate those samples that were analyzed by the laboratory.
- AB1 = Activity-based air sampling Round No. 1
- ABS = Activity-based sampling
- DUP = Field duplicate sample
- G148 = Vermiculite exfoliation site GAO 148
- NA = No bulk material samples were collected in conjunction with activity-based air sampling Round 1
- PH = High flow rate perimeter air sample
- PL = Low flow rate perimeter air sample

TABLE 6
ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 1, ACTIVITIES CONDUCTED BY PALMETTO VERMICULITE PERSONNEL

Sample Number:	56190			56191			56193			56195			56197			
Sample Designation:	G148-AB1-PL-02			G148-AB1-PL-02-DUP			G148-AB1-PL-04			G148-AB1-PL-06			G148-AB1-PL-08			
Station Identification:	G148AB101			G148AB101			G148AB102			G148AB103			G148AB104			
Sample Description:	Perimeter Upwind - Low Volume			Perimeter Upwind - Low Volume; field duplicate sample of 56190			Perimeter Downwind - Low Volume			Perimeter Downwind - Low Volume			Perimeter Downwind - Low Volume			
Sample Collection Date:	12/2/2009			12/2/2009			12/2/2009			12/2/2009			12/2/2009			
Air Volume Sampled (liters):	352.80			354.60			353.40			351.00			351.00			
Sample Preparation:	Direct			Direct			Indirect			Indirect			Indirect			
Sensitivity (s/cc):	9.8E-04			9.9E-04			9.7E-04			9.9E-04			9.8E-04			
PCM Equivalent Structures (PCME)	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual
Total Asbestos	2.3E-02	1.5E-02	- 3.2E-02		1.9E-02	1.2E-02	- 2.8E-02		3.9E-03	1.3E-03	- 8.9E-03		4.9E-03	1.9E-03	- 1.0E-02	
Total Chrysotile (CH)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Total Amphibole	2.3E-02	1.5E-02	- 3.2E-02		1.9E-02	1.2E-02	- 2.8E-02		3.9E-03	1.3E-03	- 8.9E-03		4.9E-03	1.9E-03	- 1.0E-02	
actinolite (AC)	1.1E-02	6.1E-03	- 1.8E-02		2.0E-03	3.5E-04	- 6.2E-03		0.0E+00	0.0E+00	- 2.9E-03	U	3.0E-03	8.1E-04	- 7.7E-03	
amosite (AM)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
anthophyllite (AN)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	9.7E-04	5.0E-05	- 4.6E-03		0.0E+00	0.0E+00	- 3.0E-03	U
crocidolite (CR)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
tremolite (TR)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Libby amphibole (LA)	1.2E-02	6.8E-03	- 1.9E-02		1.7E-02	1.1E-02	- 2.5E-02		2.9E-03	7.9E-04	- 7.5E-03		2.0E-03	3.5E-04	- 6.2E-03	
other amphibole (OA)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
other mineral class (OM)	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Solid Soln: Amosite	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Solid Soln: Trem-Act	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U

Notes:

$x.xE\pm yy = x.x$ multiplied times 10 raised to the yy power

% = Percent

BOLD = Results for "Air Conc (s/cc)" represented in BOLD type indicate positive values

AB1 = Activity-based air sampling Round No. 1

Conc = Concentration

DUP = Field duplicate sample

G148 = Vermiculite exfoliation site GAO 148

PCM = Phase Contrast Microscopy

PL = Low flow rate perimeter air sample

Qual = Qualifier

s/cc = Structures per cubic centimeter

Soln = Solution

U = The analyte was analyzed for, but was not detected above the level of the reported sensitivity.

TABLE 7
ACTIVITY-BASED AIR SAMPLES: ROUND 2, SWEEPING

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 2, 2009	G148AB209	G148-AB2-AH-17	56206	ABS: Backpack High Volume Sample.	120	1,186.20
December 2, 2009	G148AB209	G148-AB2-AL-18	56207	ABS: Backpack Low Volume Sample.	120	351.00
December 2, 2009	G148AB209	G148-AB2-AL-18-DUP	56208	ABS: Backpack Low Volume Sample. Field duplicate sample of 56207.	120	351.00
December 2, 2009	G148AB205	G148-AB2-PH-09	56198	ABS: Perimeter Upwind, High Volume Sample.	120	1,191.60
December 2, 2009	G148AB205	G148-AB2-PL-10	56199	ABS: Perimeter Upwind, Low Volume Sample.	120	353.40
December 2, 2009	G148AB206	G148-AB2-PH-11	56200	ABS: Perimeter Downwind, High Volume Sample.	120	1,179.60
December 2, 2009	G148AB206	G148-AB2-PL-12	56201	ABS: Perimeter Downwind, Low Volume Sample.	121	357.56
December 2, 2009	G148AB207	G148-AB2-PH-13	56202	ABS: Perimeter Downwind, High Volume Sample.	120	1,173.00
December 2, 2009	G148AB207	G148-AB2-PL-14	56203	ABS: Perimeter Downwind, Low Volume Sample.	122	358.68
December 2, 2009	G148AB208	G148-AB2-PH-15	56204	ABS: Perimeter Downwind, High Volume Sample.	120	1,188.60
December 2, 2009	G148AB208	G148-AB2-PL-16	56205	ABS: Perimeter Downwind, Low Volume Sample.	122	362.95

BULK MATERIAL SAMPLES FOR ACTIVITY-BASED: ROUND 2, SWEEPING

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
NA	NA	NA	NA	NA	NA	NA

Notes:

Adjacent rows that share the same highlighted color (yellow or green) indicate collocated air sample sets. A sample set consists of a high-volume air sample and a low-volume air sample (sometimes with a collocated field duplicate sample for one or both).

BOLD = Samples in BOLD type indicate those samples that were analyzed by the laboratory.

AB2 = Activity-based air sampling Round No. 2

ABS = Activity-based sampling

AH = High flow rate air sample

AL = Low flow rate air sample

DUP = Field duplicate sample

G148 = Vermiculite exfoliation site GAO 148

NA = No bulk material samples were collected in conjunction with activity-based air sampling Round 2

PH = High flow rate perimeter air sample

PL = Low flow rate perimeter air sample

TABLE 8
ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 2, SWEEPING

Sample Number:	56207			56208			56199			56201			56203			56205		
Sample Designation:	G148-AB2-AL-18			G148-AB2-AL-18-DUP			G148-AB2-PL-10			G148-AB2-PL-12			G148-AB2-PL-14			G148-AB2-PL-16		
Station Identification:	G148AB209			G148AB209			G148AB205			G148AB206			G148AB207			G148AB208		
Sample Description:	Backpack - Low Volume			Backpack - Low Volume; field duplicate sample of 56207			Perimeter Upwind - Low Volume			Perimeter Downwind - Low Volume			Perimeter Downwind - Low Volume			Perimeter Downwind - Low Volume		
Sample Collection Date:	12/2/2009			12/2/2009			12/2/2009			12/2/2009			12/2/2009			12/2/2009		
Air Volume Sampled (liters):	351.00			351.00			353.40			357.56			358.68			362.95		
Sample Preparation:	Indirect			Direct			Direct			Direct			Direct			Direct		
Sensitivity (s/cc):	9.9E-04			9.9E-04			9.9E-04			1.0E-03			9.9E-04			9.7E-04		
PCM Equivalent Structures (PCME)	Air Conc (s/cc)	90% Confidence Interval	Data Qual	Air Conc (s/cc)	90% Confidence Interval	Data Qual	Air Conc (s/cc)	90% Confidence Interval	Data Qual	Air Conc (s/cc)	90% Confidence Interval	Data Qual	Air Conc (s/cc)	90% Confidence Interval	Data Qual	Air Conc (s/cc)	90% Confidence Interval	Data Qual
Total Asbestos	0.0E+00	0.0E+00 - 3.0E-03	U	4.0E-03	1.4E-03 - 9.0E-03		4.0E-03	1.4E-03 - 9.1E-03		1.0E-02	5.4E-03 - 1.7E-02		0.0E+00	0.0E+00 - 3.0E-03	U	7.7E-03	3.9E-03 - 1.4E-02	
Total Chrysotile (CH)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
Total Amphibole	0.0E+00	0.0E+00 - 3.0E-03	U	4.0E-03	1.4E-03 - 9.0E-03		4.0E-03	1.4E-03 - 9.1E-03		1.0E-02	5.4E-03 - 1.7E-02		0.0E+00	0.0E+00 - 3.0E-03	U	7.7E-03	3.9E-03 - 1.4E-02	
actinolite (AC)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	2.0E-03	3.5E-04 - 6.3E-03		1.0E-03	5.1E-05 - 4.7E-03		0.0E+00	0.0E+00 - 3.0E-03	U	9.7E-04	5.0E-05 - 4.6E-03	
amosite (AM)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
anthophyllite (AN)	0.0E+00	0.0E+00 - 3.0E-03	U	9.9E-04	5.1E-05 - 4.7E-03		9.9E-04	5.1E-05 - 4.7E-03		1.0E-03	5.1E-05 - 4.7E-03		0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
crocidolite (CR)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
tremolite (TR)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
Libby amphibole (LA)	0.0E+00	0.0E+00 - 3.0E-03	U	3.0E-03	8.1E-04 - 7.7E-03		9.9E-04	5.1E-05 - 4.7E-03		8.0E-03	4.0E-03 - 1.4E-02		0.0E+00	0.0E+00 - 3.0E-03	U	6.8E-03	3.2E-03 - 1.3E-02	
other amphibole (OA)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
other mineral class (OM)	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
Solid Soln: Amosite	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U
Solid Soln: Trem-Act	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 3.0E-03	U	0.0E+00	0.0E+00 - 2.9E-03	U

Notes:

$x.E\pm y$ - $x.E$ multiplied times 10 raised to the y power

% = Percent

BOLD = Results for "Air Conc (s/cc)" represented in BOLD type indicate positive values

AB2 = Activity-based air sampling Round No. 2

AL = Low flow rate air sample

Conc = Concentration

DUP = Field duplicate sample

G148 = Vermiculite exfoliation site GAO 148

PCM = Phase Contrast Microscopy

PL = Low flow rate perimeter air sample

Qual = Qualifier

s/cc = Structures per cubic centimeter

Soln = Solution

U = The analyte was analyzed for, but was not detected above the level of the reported sensitivity.

TABLE 9
ACTIVITY-BASED AIR SAMPLES: ROUND 3, RAKING

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 3, 2009	G148AB315	G148-AB3-AH-28	56218	ABS: Backpack High Volume Sample.	120	1,183.80
December 3, 2009	G148AB315	G148-AB3-AL-29	56219	ABS: Backpack Low Volume Sample.	120	342.60
December 3, 2009	G148AB311	G148-AB3-PH-20	56210	ABS: Perimeter Upwind, High Volume Sample.	120	1,207.20
December 3, 2009	G148AB311	G148-AB3-PL-21	56211	ABS: Perimeter Upwind, Low Volume Sample.	120	348.00
December 3, 2009	G148AB312	G148-AB3-PH-22	56212	ABS: Perimeter Downwind, High Volume Sample.	120	1,188.60
December 3, 2009	G148AB312	G148-AB3-PL-23	56213	ABS: Perimeter Downwind, Low Volume Sample. This volume is given as a maximum, as toward the end of the sampling period the flow rate was initially measured to be variable at less than expected before stabilizing.	120	Maximum: 354.60
December 3, 2009	G148AB313	G148-AB3-PH-24	56214	ABS: Perimeter Downwind, High Volume Sample.	120	1,191.60
December 3, 2009	G148AB313	G148-AB3-PL-25	56215	ABS: Perimeter Downwind, Low Volume Sample.	120	352.20
December 3, 2009	G148AB314	G148-AB3-PH-26	56216	ABS: Perimeter Downwind, High Volume Sample.	120	1,173.00
December 3, 2009	G148AB314	G148-AB3-PL-27	56217	ABS: Perimeter Downwind, Low Volume Sample.	120	351.60

BULK MATERIAL SAMPLES FOR ACTIVITY-BASED: ROUND 3, RAKING

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 3, 2009	G148AB321	G148-AB3-B-35	56220	5-Point composite sample of soil and debris collected from the area of Activity-Based Round 3. Aliquots were collected from depth intervals of up to about 1 to 2 inches BGS.	NA	NA

Notes:

Adjacent rows that share the same highlighted color (yellow or green) indicate collocated air sample sets. A sample set consists of a high-volume air sample and a low-volume air sample (sometimes with a collocated field duplicate sample for one or both).

BOLD = Samples in BOLD type indicate those samples that were analyzed by the laboratory.

AB3 = Activity-based air sampling Round No. 3

ABS = Activity-based sampling

AH = High flow rate air sample

AL = Low flow rate air sample

B = Bulk material sample

BGS = Below ground surface

G148 = Vermiculite exfoliation site GAO 148

NA = Not applicable

PH = High flow rate perimeter air sample

PL = Low flow rate perimeter air sample

TABLE 10
ANALYTICAL RESULTS FOR ACTIVITY-BASED AIR SAMPLES: ROUND 3, RAKING

Sample Number:	56218				56210				56212				56214				56216			
Sample Designation:	G148-AB3-AH-28				G148-AB3-PH-20				G148-AB3-PH-22				G148-AB3-PH-24				G148-AB3-PH-26			
Station Identification:	G148AB315				G148AB311				G148AB312				G148AB313				G148AB314			
Sample Description:	Backpack - High Volume				Perimeter Upwind - High Volume				Perimeter Downwind - High Volume				Perimeter Downwind - High Volume				Perimeter Downwind - High Volume			
Sample Collection Date:	12/3/2009				12/3/2009				12/3/2009				12/3/2009				12/3/2009			
Air Volume Sampled (liters):	1,183.80				1,207.20				1,188.60				1,191.60				1,173.00			
Sample Preparation:	Direct				Direct				Direct				Direct				Direct			
Sensitivity (s/cc):	9.9E-04				9.7E-04				9.8E-04				9.8E-04				9.9E-04			
PCM Equivalent Structures (PCME)	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual	Air Conc (s/cc)	90% Confidence Interval		Data Qual
Total Asbestos	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Total Chrysotile (CH)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Total Amphibole	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
actinolite (AC)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
amosite (AM)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
anthophyllite (AN)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
crocidolite (CR)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
tremolite (TR)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Libby amphibole (LA)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
other amphibole (OA)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
other mineral class (OM)	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Solid Soln: Amosite	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U
Solid Soln: Trem-Act	0.0E+00	0.0E+00	- 3.0E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 2.9E-03	U	0.0E+00	0.0E+00	- 3.0E-03	U

Notes:

$x.xE+yy$ = $x.x$ multiplied times 10 raised to the yy power

% = Percent

BOLD = Results for "Air Conc (s/cc)" represented in BOLD type indicate positive values

AB3 = Activity-based air sampling Round No. 3

AH = High flow rate air sample

Conc = Concentration

G148 = Vermiculite exfoliation site GAO 148

PCM = Phase Contrast Microscopy

PH = High flow rate perimeter air sample

Qual = Qualifier

s/cc = Structures per cubic centimeter

Soln = Solution

U = The analyte was analyzed for, but was not detected above the level of the reported sensitivity.

TABLE 11
ANALYTICAL RESULTS FOR THE BULK MATERIAL SAMPLE
COLLECTED FOR ACTIVITY-BASED: ROUND 3, RAKING

Sample Number:	56220	
Sample Designation:	G148-AB3-B-35	
Station Identification	G148AB321	
Sample Description:	5-Point composite from Activity-Based Round 3, Raking	
Sample Collection Date:	12/3/2009	
Water Content (Percent):	26.20[‡]	
Particle Size Distribution Parameter	Result (percent)	Data Qual
Greater than 2.0 mm	40.45 [‡]	
Greater than 0.150 mm but less than 2.0 mm	39.16 [‡]	
Greater than 0.075 mm but less than 0.150 mm	5.47 [‡]	
Less than 0.075 mm	23.34 [‡]	
Total	108.42 [‡]	
Bulk Sample Analysis Parameter	Result	Data Qual
Greater than 75 µm		
Percent asbestos	None Detected	U
Type of asbestos	None Detected	U
Percent non-asbestos fibrous material	None Detected	U
Type of non-asbestos fibrous material	None Detected	U
Percent non-fibrous material	100	
Less than 75 µm		
Percent asbestos	None Detected	U
Type of asbestos	None Detected	U
Percent non-asbestos fibrous material	None Detected	U
Type of non-asbestos fibrous material	None Detected	U
Percent non-fibrous material	100	

Notes:

- ‡ = Results for water content and particle size distribution may not have been validated.
- AB3 = Activity-based air sampling Round No. 3
- B = Bulk material sample
- G148 = Vermiculite exfoliation site GAO 148
- µm = Micrometer
- mm = Millimeter
- Qual = Qualifier
- U = The analyte was analyzed for, but was not detected above the quantitation limit of 0.25%.

TABLE 12
ADDITIONAL BULK MATERIAL SAMPLES

Collection Date	Station Identification	Sample Designation	Sample Number	Sample Location and Description	Sampling Duration (minutes)	Air Volume Sampled (liters)
December 3, 2009	G148BS17	G148-BS-31	56221	Grab sample collected from a pile of what was reportedly concentrated vermiculite, located in one of several covered storage bays along the southeastern side of the large building complex at the GAO 148 site.	NA	NA
December 3, 2009	G148BS18	G148-BS-32	56222	Grab sample collected from a pile of what was reportedly concentrated vermiculite, located in one of several covered storage bays along the southeastern side of the large building complex at the GAO 148 site.	NA	NA
December 3, 2009	G148BS19	G148-BS-33	56223	Grab sample collected from a pile of what was reportedly concentrated vermiculite from Africa, located in a covered storage bay inside the northeastern end of the large building complex at the GAO 148 site.	NA	NA
December 3, 2009	G148BS20	G148-BS-34	56224	Grab sample collected from a pile of what was reportedly concentrated vermiculite from China, located in a covered storage bay inside the northeastern end of the large building complex at the GAO 148 site; this pile was at the opposite end of the same storage bay where the pile for sample G148-BS-33 was located.	NA	NA

Notes:

BOLD = Samples in BOLD type indicate those samples that were analyzed by the laboratory.

BS = Bulk material sample not associated with a particular activity-based air sampling round.

G148 = Vermiculite exfoliation site GAO 148

NA = Not applicable

TABLE 13
ANALYTICAL RESULTS FOR ADDITIONAL BULK MATERIAL SAMPLES

Sample Number:	56221		56222		56223		56224	
Sample Designation:	G148-BS-31		G148-BS-32		G148-BS-33		G148-BS-34	
Station Identification:	G148BS17		G148BS18		G148BS19		G148BS20	
Sample Description:	Grab sample from a pile reportedly consisting of concentrated vermiculite		Grab sample from a pile reportedly consisting of concentrated vermiculite		Grab sample from a pile reportedly consisting of concentrated vermiculite from Africa		Grab sample from a pile reportedly consisting of concentrated vermiculite from China	
Sample Collection Date:	12/3/2009		12/3/2009		12/3/2009		12/3/2009	
Water Content (Percent):	4.14		8.00		3.59		6.77	
TEM Bulk Sample Analysis Parameter	Result	Data Qual	Result	Data Qual	Result	Data Qual	Result	Data Qual
TEM Suspension								
Percent asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	NA	
Type of asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	NA	
Percent non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	NA	
Type of non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	NA	
Percent non-fibrous material	100	J	100	J	100	J	NA	
Type of non-fibrous material	SiAlMg M+	J	SiAlMg M+	J	SiAlMg M+	J	NA	
	K, Potassium Matrix	J	K, Potassium Matrix	J	K, Potassium Matrix	J	NA	
	Fe, Iron Oxide	J	Fe, Iron Oxide	J	Fe, Iron Oxide	J	NA	
Particle Size Distribution Parameter	Result (percent)	Data Qual	Result (percent)	Data Qual	Result (percent)	Data Qual	Result (percent)	Data Qual
Greater than 2.0 mm	0.00		95.61		94.09		90.61	
Greater than 0.150 mm but less than 2.0 mm	95.90		14.46		6.27		4.81	
Greater than 0.075 mm but less than 0.150 mm	3.51		0.45		0.35		0.59	
Less than 0.075 mm	17.97		19.75		18.80		18.92	
Total	117.37		130.28		119.50		114.93	
PLM Bulk Sample Analysis Parameter	Result	Data Qual	Result	Data Qual	Result	Data Qual	Result	Data Qual
Sinks								
Percent asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Type of asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Percent non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Type of non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Percent non-fibrous material	100	J	100	J	100	J	100	J
Floats								
Percent asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Type of asbestos	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Percent non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Type of non-asbestos fibrous material	None Detected	UJ	None Detected	UJ	None Detected	UJ	None Detected	UJ
Percent non-fibrous material	100	J	100	J	100	J	100	J

Notes:

BS = Bulk material sample not associated with a particular activity-based air sampling round.

G148 = Vermiculite exfoliation site GAO 148

mm = Millimeter

NA = Not applicable

PLM = Polarized Light Microscopy

Qual = Qualifier

TEM = Transmission Electron Microscopy

J = The result is qualified as estimated due to laboratory quality control deficiencies.

UJ = The analyte was analyzed for, but was not detected. Due to laboratory quality control deficiencies, the result is qualified as estimated.

APPENDIX C
LOGBOOK NOTES AND FIELD SHEETS
(24 Sheets)

LOGBOOK G148-LOG-01



"Rite in the Rain"
ALL-WEATHER
JOURNAL
No. 391

Age Group	No	Yes	Don't know	No answer	Other
1	~85%	~10%	~5%	~0%	~0%
2	~80%	~15%	~5%	~0%	~0%
3	~75%	~20%	~5%	~0%	~0%
4	~70%	~25%	~5%	~0%	~0%
5	~65%	~30%	~5%	~0%	~0%
6	~60%	~35%	~5%	~0%	~0%



Name _____

Address _____

Phone _____

Project _____

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CONTENTS		
PAGE	REFERENCE	DATE
	LOGBOOK G148-LOG-01	
	VERMICULITE LEXFO PALMETTO GAD 148	
	TDO No. ITEM I - 05-003-0078	
	TETRA TECH EM, INC. 1955 EVERGREEN BOULEVARD BUILDING 200, SUITE 300 DULUTH, GEORGIA 30096	
	CONTACT: JOHN SCHENDEL 404-373-8768 LEONARDO CEXON 678-936-1017	

12/2/09

John Schudel

0800 - START personnel and OSC Gurn arrive at site.

Weather: Very rainy, cold, winds out of WNW.

PHOTO LOG FOR 12/3/09 John Schudel

PHOTO No.	ORIENTATION	DESCRIPTION
0251.JPG	NW	This is a photo of a pump, but also it shows the location of the nearby culvert (nearby to AB ③) in the left center, and the ditch leading from it (left center to center behind pump).
0255.JPG	NORTH	Downward-facing photo of head (discharge point) of culvert and puddled water in the ditch. Note floating vermiculite in the water.
0256.JPG	NORTH	Photo of ditch leading from culvert discharge point. Culvert is at bottom, beneath rock ledge, and the ditch is the shallow, linear depression going from bottom to top of photo.

12/2/09

John Schudel

~1700 - START personnel leave site.

Notes for 12/2/09: While air sampling and activity-based rounds ① and ② were being conducted, the vermiculite separation facility was conducting operations. These operations included forklift and mini-digger work inside the building that moved material around. Exfoliation of vermiculite may have been occurring. Personnel were also filling containers and working in various areas.

START intended to collect a sample of the swept, bulk material resulting from activity-based Round No. 2, but the sample was not collected before leaving site on 12/2/09. By the time on 12/3/09, the next day, when START was able to go and collect a sample of this bulk material, the material had either already been removed or was so re-spread out and obscured by subsequent operations at the facility so as to become not representative of the material that was swept. As a result, a bulk sample was not collected in association with activity-based Round 2.

12/3/09 John Schendel
0805- START arrived at site.

WEATHER: Clear, sunny, some breeze,
cool.

1405- START personnel and OSC Gen
Leave site.

[FOR PHOTLOG, SEE PAGE 2.]

Note for 12/3/09: During the air sampling
associated with activity-based Round No.
3, as well as during the bulk sampling
that was conducted on this day, this
facility was conducting operations. Effluents
of verminulite may have been occurring.

John Schendel
12/3/09

12/3/09

John Schendel

Note Regarding Activity-Based Sampling
Round No. ① and ② Conducted on 12/2/09:

The building housing all of the facility
operations is roofed, and has external
walls covering parts but not all of the
external edges of the facility. Consequently,
it was felt by OSC Gen and START
personnel that the structure was too
open and exposed to wind and weather
to enable an aggressive air sampling
event to occur inside of it. This is
why the "indoor" sampling that was
done on 12/2/09 was conducted as
two activity-based air sampling events.
No aggressive air sampling event was
conducted at this facility.

John Schendel
12/3/09

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US PAT NO: 6,863,940



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TDD No.: TTEMI-05-003-0078

Date: 12/2/09

Background Air Sampling, Field and Lot Blanks, and Meteorological Station

Photo No./Facing							Met Station
Affix Label Here							Make and Model: Davis Vantage Pro Model No. 6160
Station ID G148-							Serial No.: Mfg. Code: A11127A77
Sample Name G148-							Other Specifications: CAN 3788104116A
Field Duplicates							
High/Low Set							
Location							LAT. 34.69817762
Latitude (decimal degrees)							LONG. -81.99798601
Longitude (decimal degrees)							
Pump Type & No.							
Sample Media							Parameters Units
Pump Start Time							Wind Speed: MPH
Stop Time/ Elapsed Minutes							Wind Direction: YES
Restart Time							Temperature: °F
Stop Time/ Elapsed Minutes							Relative Humidity: PERCENT
Restart Time							Precipitation: INCHES
Stop Time/ Elapsed Minutes							Atmospheric Pressure: INCHES
Restart Time							
Pump Final Stop Time							
Pump Total Run Time (minutes)							
Rotameter No. Start/End							Met Station Notes:
Starting Flow Rate (L/min)							
Ending Flow Rate (L/min)							
Average Flow Rate (L/min)							
Sampled Air Volume (L)							

Notes: No outdoor background air sample will be collected today due to the heavy rain.

Site Name: Vermiculite Exfo Palmetto GAO 148 Page 1 of 23

TDD No.: TTEMI-05-003-0078 Date: 12/2/09

Activity: ACTIVITY BASED - ACTUAL ROUTINE ACTIVITIES Round: 1

Photo No./Facing	56188	56189	56190	56191	56192	56193	56194	56195	56196	56197
Affix Label Here										
Station ID	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-
Sample Name	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-
Field Duplicates										
High/Low Set										
Location	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW	UPLAND PALMETTO HIGH FLOW
Latitude (decimal degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Longitude (decimal degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pump Type & No.	AIRCON G6	AIRCON G1	SKC \$8	SKC \$7	AIRCON G5	SKC \$9	AIRCON G2	SKC \$1	AIRCON G4	SKC \$3
Sample Media	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm
Pump Start Time	1126	1126	1126	1126	1126	1126	1126	1126	1126	1126
Stop Time/ Elapsed Minutes										
Restart Time										
Stop Time/ Elapsed Minutes										
Restart Time										
Stop Time/ Elapsed Minutes										
Restart Time										
Pump Final Stop Time										
Pump Total Run Time (minutes)	120	120	120	120	120	120	120	120	120	120
Rotameter No. Start/End	H1 H1	H1 H1	L2 L2	L2 L2	H1 H1	L2 L2	H1 H1	L2 L2	H1 H1	L2 L2
Starting Flow Rate (L/min)	10	10	3	3	10	3	10	3	10	3
Ending Flow Rate (L/min)	9.96	9.81	2.88	2.91	9.91	2.89	9.91	2.85	9.81	2.85
Average Flow Rate (L/min)	9.98	9.95	2.94	2.955	9.955	2.945	9.955	2.925	9.95	2.925
Sampled Air Volume (L)	1,197.6	1,188.6	352.8	354.6	1,194.6	353.4	1,194.6	351	1,188.6	351

Notes: STANT performed no activity. Instead, site workers were observed down various activities in the area, including: sweeping, bagging of asbestos vermiculite and using hand earth and fork lift to move pallets around. This sample round was intended to sample

Activity Participant Time In Time Out

BKAyy; AAny; ABny; BSyy

-BKA-##; -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148 Page 2 of 23

TDD No.: TTEMI-05-003-0078 Date: 12/2/09

Activity: ACTIVITY BASED - ACTUAL ROUTINE ACTIVITIES Round: 1

Photo No./Facing										
Affix Label Here										
Station ID	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-
Sample Name	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-	G148-
Field Duplicates										
High/Low Set										
Location										
Latitude (decimal degrees)										
Longitude (decimal degrees)										
Pump Type & No.										
Sample Media										
Pump Start Time										
Stop Time/ Elapsed Minutes										
Restart Time										
Stop Time/ Elapsed Minutes										
Restart Time										
Stop Time/ Elapsed Minutes										
Restart Time										
Pump Final Stop Time										
Pump Total Run Time (minutes)										
Rotameter No. Start/End										
Starting Flow Rate (L/min)										
Ending Flow Rate (L/min)										
Average Flow Rate (L/min)										
Sampled Air Volume (L)										

Notes: in doing typical, normal operations at the facility that were actually observed occurring, as opposed to creating our own activity that may be less typical. 20 Oct Page 3 →

Activity Participant Time In Time Out

BKAyy; AAny; ABny; BSyy

-BKA-##; -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148		Page of	
TDD No.: TTEMI-05-003-0078		Date:	
Activity:		Round:	
Photo No./Facing			
Affix Label Here			
Station ID			
G148-			
Sample Name			
G148-			
Field Duplicates			
High/Low Set			
Location			
Latitude			
(decimal degrees)			
Longitude			
(decimal degrees)			
Pump Type & No.			
Sample Media			
Pump Start Time			
Stop Time/			
Elapsed Minutes			
Restart Time			
Stop Time/			
Elapsed Minutes			
Restart Time			
Stop Time/			
Elapsed Minutes			
Restart Time			
Pump Final			
Stop Time			
Pump Total Run			
Time (minutes)			
Rotameter No.			
Start/End			
Starting Flow Rate			
(L/min)			
Ending Flow Rate			
(L/min)			
Average Flow			
Rate (L/min)			
Sampled Air			
Volume (L)			
Notes:	Activity Participant	Time In	Time Out

BKAyy; AAnyy; ABnyy; BSyy

-BKA-##; -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148		Page ^(B) ^(W) of 22 ²³		
TDD No.: TTEMI-05-003-0078		Date: 12/2/09		
Activity: Bulk Material for ACTIVITY-BASED: ACTUAL LOGTIME ACTIVITIES		Round: ①		
Photo No./Facing				
Affix Label Here				
Station ID				
G148-				
Sample Name				
G148-				
Field Duplicates				
Sample Collection Time				
Check One	Debris ^a			
	Soil ^a			
Equipment (check all that apply)	Vermiculite Attic Insulation (VAI) ^a			
	SS Auger			
	SS Spoon			
	SS Bowl			
	8-ounce Jar			
Grab/Composite Information	Three 1-gallon ziplock bags			
	Grab (Gr) or Composite (Co)	Gr	Co	
	Grab Depth			
	Interval (inches)			
	No. of Composite Aliquots			
	No. 1 Depth			
	Interval (inches)			
	No. 2 Depth			
	Interval (inches)			
	No. 3 Depth			
Interval (inches)				
No. 4 Depth				
Interval (inches)				
No. 5 Depth				
Interval (inches)				
Sampling Location				
Draw Aliquot Locations Relative to One Another (also see associated figure):	<p>Note: No bulk material sample was collected in association with Activity-Based Round ①.</p> <p>N ↑</p>			
Notes: all filter cassettes were arranged so that their openings faced generally downward and were about 4 feet above the floor or ground surface.				

^a = Collect debris or soil in one 8-ounce jar and VAI in three 1-gal. ziplock bags

AAnyy with -AAn-B-##
AByy with -ABn-B-##
BSyy with -BS-##

-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148								Page 1 of 3	
TDD No.: TTEMI-05-003-0078				Date: 12/2/09					
Activity: ACTIVITY BASED - INTERMITTENT DRAINING SWEEPING								Round: (2)	
Photo No/Facing	0242 JRC / NW	0243 JRC / SE	0244 JRC / SE	0245 JRC / NW					
Affix Label Here	56198	56199	56200	56201	56202	56203	56204	56205	
Station ID	A6205	A6205	A6206	A6206	A6207	A6207	A6208	A6208	
G148-									
Sample Name	A62-AH	A62-PL	A62-AH	A62-PL	A62-AH	A62-PL	A62-AH	A62-PL	
G148-	-09	-10	-11	-12	-13	-14	-15	-16	
Field Duplicates									
High/Low Set									
Location	APRIL 1980 HIGH FLOW	APRIL 1980 LOW FLOW	APRIL 1980 HIGH FLOW	APRIL 1980 LOW FLOW	APRIL 1980 HIGH FLOW	APRIL 1980 LOW FLOW	APRIL 1980 HIGH FLOW	APRIL 1980 LOW FLOW	
Latitude (decimal degrees)	NA	NA	NA	NA	NA	NA	NA	NA	
Longitude (decimal degrees)	NA	NA	NA	NA	NA	NA	NA	NA	
Pump Type & No.	AIRCON E4	SKC 45	AIRCON E11	GILAIR B4	AIRCON E12	GILAIR B1	AIRCON E8	GILAIR B3	
Sample Media	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	
Pump Start Time	1417	1417	1417	1417	1417	1417	1417	1417	
Stop Time/ Elapsed Minutes									
Restart Time									
Stop Time/ Elapsed Minutes									
Restart Time									
Stop Time/ Elapsed Minutes									
Restart Time									
Pump Final Stop Time									
Pump Total Run Time (minutes)	120	120	120	121	120	122	120	122	
Rotameter No. Start/End	H1 H1	L2 L2	H1 H1	L2 L2	H1 H1	L2 L2	H1 H1	L2 L2	
Starting Flow Rate (L/min)	10	3	10	3	10	3	10	3	
Ending Flow Rate (L/min)	9.86	2.89	9.66	2.91	9.55	2.88	9.81	2.95	
Average Flow Rate (L/min)	9.93	2.945	9.83	2.955	9.775	2.94	9.905	2.975	
Sampled Air Volume (L)	1,191.6	353.4	1,179.6	357.555	1,173	358.68	1,188.6	362.95	
Notes:	Activity Participant: VICKY FARRER, DEBBIE KRISTIAN, ADRIUS KRISTIAN 1417 1451 1516 1531 1540 1600/1557 SWEET 1540 SWEET 1557 A half hour, and then spent the rest of the time standing in the can designated for sweeping. Meanwhile, workers at the plant periodically loaded hoppers adjacent to the array.								

Notes: (cont.) area with vermiculite concentration, using a small front-end loader. The hoppers 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Site Name: Vermiculite Exfo Palmetto GAO 148								Page 2 of 3	
TDD No.: TTEMI-05-003-0078				Date: 12/2/09					
Activity: ACTIVITY BASED - INTERMITTENT DRAINING SWEEPING								Round: (2)	
Photo No/Facing	0241 JRC / SSW								
Affix Label Here	56206	56207	56208						
Station ID	A6209	A6209	A6209						
G148-									
Sample Name	A62-AH	A62-AZ	A62-AZ						
G148-	-17	-18	-18						
Field Duplicates									
High/Low Set									
Location	APRIL 1980 HIGH FLOW	APRIL 1980 LOW FLOW	APRIL 1980 HIGH FLOW						
Latitude (decimal degrees)	NA	NA	NA						
Longitude (decimal degrees)	NA	NA	NA						
Pump Type & No.	QUICKTRAK Q3	SKC 510	SKC 32						
Sample Media	0.8µm	0.8µm	0.8µm						
Pump Start Time	1417	1417	1417						
Stop Time/ Elapsed Minutes									
Restart Time									
Stop Time/ Elapsed Minutes									
Restart Time									
Stop Time/ Elapsed Minutes									
Restart Time									
Pump Final Stop Time									
Pump Total Run Time (minutes)	120	120	120						
Rotameter No. Start/End	H1 H1	L2 L2	L2 L2						
Starting Flow Rate (L/min)	9.96	3	3						
Ending Flow Rate (L/min)	9.81	2.85	2.85						
Average Flow Rate (L/min)	9.885	2.925	2.925						
Sampled Air Volume (L)	1,186.2	351	351						
Notes:	Activity Participant: VICKY FARRER, DEBBIE KRISTIAN, ADRIUS KRISTIAN 1417 1451 1516 1531 1540 1600/1557 SWEET 1540 SWEET 1557 A half hour, and then spent the rest of the time standing in the can designated for sweeping. Meanwhile, workers at the plant periodically loaded hoppers adjacent to the array.								

Notes: (cont.) area with vermiculite concentration, using a small front-end loader. The hoppers 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732,

Site Name: Vermiculite Exfo Palmetto GAO 148		Page of	
TDD No.: TTEMI-05-003-0078		Date:	
Activity:		Round:	
Photo No./Facing			
Affix Label Here			
Station ID			
G148-			
Sample Name			
G148-			
Field Duplicates			
High/Low Set			
Location			
Latitude (decimal degrees)			
Longitude (decimal degrees)			
Pump Type & No.			
Sample Media			
Pump Start Time			
Stop Time/Elapsed Minutes			
Restart Time			
Stop Time/Elapsed Minutes			
Restart Time			
Stop Time/Elapsed Minutes			
Restart Time			
Pump Final Stop Time			
Pump Total Run Time (minutes)			
Rotameter No.			
Start/End			
Starting Flow Rate (L/min)			
Ending Flow Rate (L/min)			
Average Flow Rate (L/min)			
Sampled Air Volume (L)			
Notes:	Activity Participants Time In Time Out		

BKAyy; AAnyy, ABayy; BSyy

-BKA-##; -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

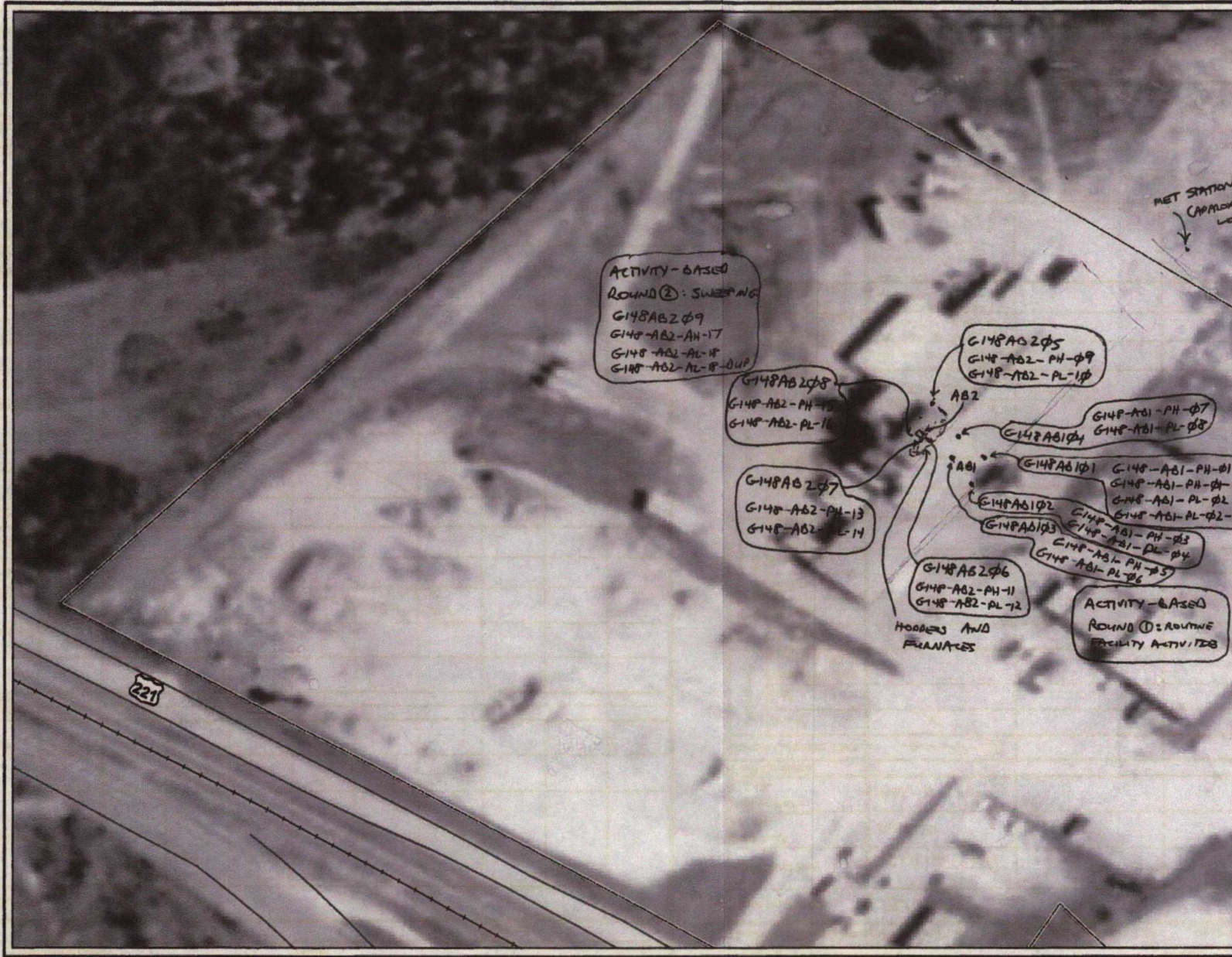
-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148		Page 3 of 3	
TDD No.: TTEMI-05-003-0078		Date: 12/2/09	
Activity: Bulk Material for ACTIVITY AREA: INTERMITTENT SWEEPING		Round: 2	
Photo No./Facing	SAMPLE NOT COLLECTED		
Affix Label Here			
Station ID	AB216		
Sample Name	-AB2-B-3p		
G148-			
Field Duplicates			
Sample Collection Time	12/2/09		
Check One	Debris*	X	
	Soil*		
	Vermiculite Attic Insulation (VAI)*		
Equipment (check all that apply)	SS Auger		
	SS Spoon	X	
	SS Bowl	X	
	8-ounce Jar	X	
	Three 1-gallon ziplock bags		
Grab (Gr) or Composite (Co)	Gr	Co	Gr Co Gr Co Gr Co
Grab Depth			
Interval (inches)			
No. of Composite Aliquots	Sample not collected because by the time we got back to this area, it was too dark to perform a sweep. (12/3/09) (B)		
No. 1 Depth			
Interval (inches)			
No. 2 Depth			
Interval (inches)			
No. 3 Depth			
Interval (inches)			
No. 4 Depth			
Interval (inches)			
No. 5 Depth			
Interval (inches)			
Sampling Location	Sample not collected because not representative of the material we swept. (B)		
Draw Aliquot Locations Relative to One Another (also see associated figure):	Note: All aliquots were collected as they were opened, placed generally downward and was about 4 feet above the floor or ground surface.		
Notes:	Further note about sweeping activity: The sweeping participant swept by sweeping a roughly rectangular area of the floor. A participant first swept across the entire area from one edge to the opposite edge. Then, the participant turned 90° to the adjacent edge and swept across the area again. The participant continued turning 90° each time so that debris that had been swept up in a previous sweep was redistributed and swept across the area to the opposite side. In addition, when the second activity participant was not sweeping, she removed the sweeping area until the entire 2-hour period was over. Internationally, a belt buckle of the sweeping area, as well as other equipment contained within appeared to be vermiculite. Both the first and second and these other belt buckle items caused a lot of dust to be generated.		

a = Collect debris or soil in one 8-ounce jar and VAI in three 1-gal. ziplock bags.

AAnyy with -AAn-B-## well as other equipment contained within appeared to be vermiculite. Both the first and second and these other belt buckle items caused a lot of dust to be generated.
ABnyy with -ABn-B-##
BSyy with -BS-##

12/2/09 ACTIVITY-BASED: ROUNDS ① AND ②

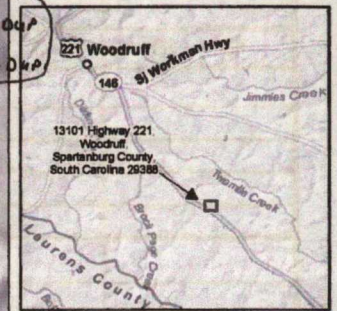


- Legend**
- Approximate Property Boundary
 - Street Boundary
 - Railroad



0 50 100 Feet

MAP SOURCE:
ImageConnect Digital Globe®
GlobeXplorer 04-17-2009



United States Environmental Protection Agency

VERMICULITE PALMETTO
EXPO GAO 148
WOODRUFF,
SPARTANBURG COUNTY,
SOUTH CAROLINA
TOD No. TTEMI-05-003-0078




**FIGURE 3
WORKING MAP
OVERALL**



12/2/09 ACTIVITY BASED ROUTES ① AND ②

(REMARK NOTES)

Legend

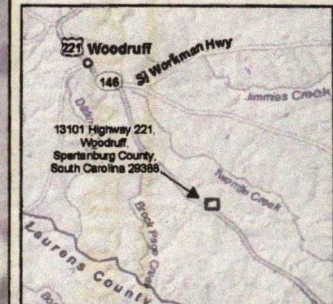
-  Approximate Property Boundary
-  Street Boundary
-  Railroad



0 50 100 Feet

MAP SOURCE:
Imagery: Digital Globe
GlobeXplorer 04-17-2009


G-148AB205
G-148AB206
G-148AB101
G-148AB102
G-148AB103
G-148AB104
G-148AB207
G-148AB208
AB2






United States Environmental Protection Agency

VERMICULITE PALMETTO
EXFO GAO 148
WOODRUFF
SPARTANBURG COUNTY,
SOUTH CAROLINA
TDD No. TTEM1-05-003-0078

FIGURE 3
WORKING MAP
OVERALL

 TETRA TECH

CERTIFICATION

SKC Omega Specialty Division is committed to manufacturing the highest quality 25mm cassette for asbestos sampling. This commitment is backed by the  Seal of Approval which assures a higher standard for cassetted reliability.  approved cassettes are assembled in a full HEPA filtered clean environment. Our cassettes comply with both the NIOSH 7400 method which allows up to 5 fibers/100 fields and OSHA ID 160 regulations which allow only 4 fibers/100 fields. Look for the  Seal of Approval when purchasing any air monitoring cassettes.

Cassette Category	25mm, 3 piece conductive cassette
Lot Number	<u>8158-7D9PASK-265</u>
Compliance	<u>NIOSH 7400, OSHA ID160</u>

Average Background Count	<u>1.75</u>	Fibers/100 Fields
PCM Analysis		<u>Passed</u>

Clearing:	
Acetone Vapor	<u>Passed</u>
DP/DO (Monitoring Solution)	<u>Passed</u>

Plastic Conductivity by ASTM D-257	<u>2.3 x 10 ohms-cm</u>
-------------------------------------------	-------------------------

Percent Carbon by ASTM D-1603	<u>19.05</u>
--------------------------------------	--------------

Cowl Conductivity by Resistance Meter	<u>10-5008 avg. (x1000)</u>
----------------------------------------------	-----------------------------

Filter Material	<u>MCE</u>
------------------------	------------

Pore Size	<u>0.8 μm</u>
------------------	------------------------------

Pad Material	<u>Cellulosic</u>
---------------------	-------------------

Effective Filter Area	<u>385 mm²</u>
------------------------------	---------------------------

Cowl Length	<u>2 in</u>
--------------------	-------------

Analyst	<u>PH</u>
----------------	-----------

Please keep for your records



1-800-752-8472

TDD No.: TTEMI-05-003-0078

Date: 12/3/09

Background Air Sampling (Field and Lot Blanks) and Meteorological Station

Photo No./Facing	NA	NA		NA	NA	Met Station	
Affix Label Here	56184	56185		56186	56187	Make and Model:	
Station ID	LOT 22	LOT 23		FB 24	FB 25	Serial No.:	
Sample Name	LOT -	LOT -		FB -	FB -	Other Specifications:	
G148-	08-36	08-37		08-38	08-39		
Field Duplicates							
High/Low Set							
Location	0.8µm Filter LOT BLANK	0.8µm Filter LOT BLANK		0.8µm Filter FIELD BLANK	0.8µm Filter FIELD BLANK		
Latitude (decimal degrees)	NA	NA		NA	NA		
Longitude (decimal degrees)	NA	NA		NA	NA		
Pump Type & No.	NA	NA		NA	NA	Parameters	Units
Sample Media	0.8µm	0.8µm		0.8µm	0.8µm	Wind Speed:	
Pump Start Time	NA	NA		NA	NA	Wind Direction:	
Stop Time/ Elapsed Minutes	/	/	/	/	/	Temperature:	
Restart Time	/	/	/	/	/	Relative Humidity:	
Stop Time/ Elapsed Minutes	/	/	/	/	/	Precipitation:	
Restart Time	/	/	/	/	/	Atmospheric Pressure:	
Stop Time/ Elapsed Minutes	/	/	/	/	/		
Restart Time	/	/	/	/	/		
Pump Final Stop Time	/	/	/	/	/		
Pump Total Run Time (minutes)	/	/	/	/	/		
Rotameter No.	/	/	/	/	/	Met Station Notes: (5) NOTE:	
Start/End	/	/	/	/	/	Specifications for 0.8µm MCE filter cassette:	
Starting Flow Rate L/min)	/	/	/	/	/	SKC INC. Catalog No. 225-321A; Pre-Washed	
Ending Flow Rate L/min)	/	/	/	/	/	Cassette, MCE, Inst. Cal. @, PCM, Asbestos, 0.8µm,	
Average Flow Rate (L/min)	/	/	/	/	/	25mm Pre-Washed (SC/PM); Lot No. P158-	
Sampled Air Volume (L)	/	/	/	/	/	709PAK-265; Exp. Date 10/2012; Certification	
Notes:						Lot No. P158-709PAK-265	

Site Name: Vermiculite Exfo Palmetto GAO 148					Page / of /	
TDD No.: TTEMI-05-003-0078			Date: 12/3/09			
Background Air Sampling, Field and Lot Blanks, and Meteorological Station						
Photo No./Facing	0247 JRG WEST				Met Station	
Affix Label Here	56209				Make and Model: Davis Vantage Pro Model No. 6160	
Station ID	G148-	BKA10			Serial No.: Mfg. Code: A11127A77	
Sample Name	G148-	BKA-19			Other Specifications: CAN 3788104116A	
Field Duplicates						
High/Low Set						
Location	Background AIR					
Latitude (decimal degrees)	34.6980	4077			→ Same as given at left.	
Longitude (decimal degrees)	-81.9997	7470			→ Same as given at left.	
Pump Type & No.	AIRCON G6				Parameters	Units
Sample Media	0.8µm				Wind Speed:	MPH
Pump Start Time	1027				Wind Direction:	YES
Stop Time/ Elapsed Minutes	/	/	/	/	Temperature:	°F
Restart Time					Relative Humidity:	PERCENT
Stop Time/ Elapsed Minutes	/	/	/	/	Precipitation:	INCHES
Restart Time					Atmospheric Pressure:	INCHES
Stop Time/ Elapsed Minutes	/	/	/	/		
Restart Time						
Pump Final Stop Time	1307					
Pump Total Run Time (minutes)	160					
Rotameter No.	H1				Met Station Notes:	
Start/End	H1	/	/	/		
Starting Flow Rate (L/min)	10					
Ending Flow Rate (L/min)	9.66					
Average Flow Rate (L/min)	9.83					
Sampled Air Volume (L)	1,572.8					
Notes: The background filter cassette was energized so that decaying focal generally downward and was about 4 feet above the ground surface.						

Site Name: Vermiculite Exfo Palmetto GAO 148										Page 1 of 3	
TDD No.: TTEMI-05-003-0078										Date: 12/3/09	
Activity: ACTIVITY-BASED: RAKING										Round: (3)	
Photo No./Facing	0251.JPG/NW	0252.JPG/NW	0253.JPG/NW	0254.JPG/NW							
Affix Label Here	56210	56211	56212	56213	56214	56215	56216	56217			
Station ID	A6311	A6311	A6312	A6312	A6313	A6313	A6314	A6314			
Sample Name	-A63-AH	-A63-PL	-A63-AH	-A63-PL	-A63-AH	-A63-PL	-A63-AH	-A63-PL			
G148-	-20	-21	-22	-23	-24	-25	-26	-27			
Field Duplicates											
High/Low Set											
Location	UPWIND PALMETTO WEST FENCE	UPWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE			
Latitude (decimal degrees)	Center of facility area: 34.69814741										
Longitude (decimal degrees)	-81.99962140										
Pump Type & No.	AIRCON G4	SKC \$6	AIRCON G1	SKC \$9	AIRCON G5	SKC \$3	AIRCON G2	SKC \$8			
Sample Media	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm	0.8µm			
Pump Start Time	1057	1057	1057	1057	1057	1057	1057	1057			
Stop Time/ Elapsed Minutes											
Restart Time											
Stop Time/ Elapsed Minutes											
Restart Time											
Stop Time/ Elapsed Minutes											
Restart Time											
Pump Final Stop Time											
Pump Total Run Time (minutes)	120	120	120	120	120	120	120	120			
Rotameter No.	H1	L2	H1	L2	H1	L2	H1	L2			
Start/End	H1	L2	H1	L2	H1	L2	H1	L2			
Starting Flow Rate (L/min)	10	3	10	3	10	3	10	3			
Ending Flow Rate (L/min)	10.12	2.80	9.81	2.91	9.86	2.87	9.55	2.86			
Average Flow Rate (L/min)	10.06	2.9	9.905	2.955	9.93	2.935	9.775	2.93			
Sampled Air Volume (L)	1,207.2	348	1,188.6	354.6	1,191.6	352.2	1,173	351.6			
Notes: The activity involves raking, using both a leaf rake and a garden rake. Each participant rakes from the edge of the approximately 20 ft x 20 ft area to the other, rotating 90° repeatedly raking from that same edge, rotating 90° again, and continuing raking and rotating around and around the area.										Activity Participant Time In 1957 1137 Time Out 1137	

BKAyy; AAny; ABny; BSyy

-BKA-##: -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

Site Name: Vermiculite Exfo Palmetto GAO 148										Page 2 of 3	
TDD No.: TTEMI-05-003-0078										Date: 12/3/09	
Activity: ACTIVITY-BASED: RAKING										Round: (3)	
Photo No./Facing	0250.JPG/NW										
Affix Label Here	56218	56219									
Station ID	A6315	A6315									
Sample Name	-A63-AH	-A63-AL									
G148-	-28	-29									
Field Duplicates											
High/Low Set											
Location	DOWNWIND PALMETTO WEST FENCE	DOWNWIND PALMETTO WEST FENCE									
Latitude (decimal degrees)	See previous page.										
Longitude (decimal degrees)	See previous page.										
Pump Type & No.	QUICKTIME G3	SKC \$7									
Sample Media	0.8µm	0.8µm									
Pump Start Time	1057	1057									
Stop Time/ Elapsed Minutes											
Restart Time											
Stop Time/ Elapsed Minutes											
Restart Time											
Stop Time/ Elapsed Minutes											
Restart Time											
Pump Final Stop Time											
Pump Total Run Time (minutes)	120	120									
Rotameter No.	H1	L2									
Start/End	H1	L2									
Starting Flow Rate (L/min)	10.07	3									
Ending Flow Rate (L/min)	9.66	2.71									
Average Flow Rate (L/min)	9.865	2.855									
Sampled Air Volume (L)	1,183.8	342.6									
Notes: Each participant alternates using the leaf rake and the garden rake. The leaf rake is used to conduct from 90° sweep of the area, and then the garden rake is used to conduct the rest from 90° sweep. Then, it's back to the leaf rake, and so forth. The ground is litteral with gravel and it is wet. This area is a low area.										Activity Participant Time In Time Out	

BKAyy; AAny; ABny; BSyy

-BKA-##: -AAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP



ALERT
MAY

Site Name: Vermiculite Exfo Palmetto GAO 148		Page of	
TDD No.: TTEMI-05-003-0078		Date:	
Activity:		Round:	
Photo No./Facing			
Affix Label Here			
Station ID			
G148-			
Sample Name			
G148-			
Field Duplicates			
High/Low Set			
Location			
Latitude (decimal degrees)			
Longitude (decimal degrees)			
Pump Type & No.			
Sample Media			
Pump Start Time			
Stop Time/Elapsed Minutes			
Restart Time			
Stop Time/Elapsed Minutes			
Restart Time			
Stop Time/Elapsed Minutes			
Restart Time			
Pump Final Stop Time			
Pump Total Run Time (minutes)			
Rotameter No.			
Start/End			
Starting Flow Rate (L/min)			
Ending Flow Rate (L/min)			
Average Flow Rate (L/min)			
Sampled Air Volume (L)			
Notes:	Activity Participant Time In Time Out		

BKAyy; AAm yy; ABnyy; BSyy

-BKA-##; -AAAn-[AH, AL, B, D, PH]-##;
-ABn-[AH, AL, B, D, PH, PL]-##; -BS-##

-LOT-[08, 45]-##; -FB-[08, 45]-##;
-DUP

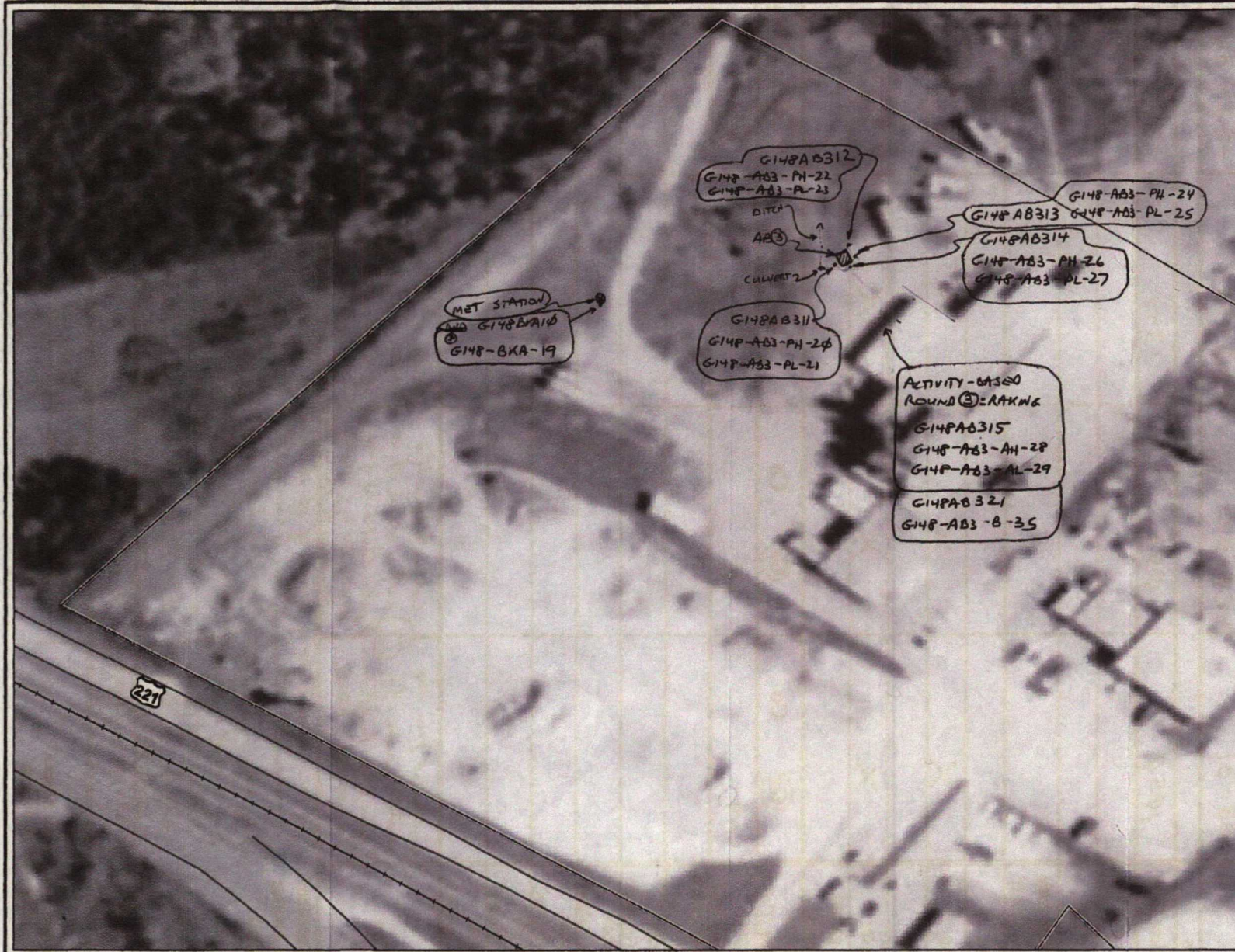
Site Name: Vermiculite Exfo Palmetto GAO 148		Page 3 of 3	
TDD No.: TTEMI-05-003-0078		Date: 12/3/09	
Activity: Bulk Material for ACTIVITY-BASED-RAKING		Round: (3)	
Photo No./Facing			
Affix Label Here	56220		
Station ID	AB321		
G148-			
Sample Name	-AB3-B-35		
G148-			
Field Duplicates			
Sample Collection Time	1318		
Check One			
Debris*	X		
Soil*	X		
Vermiculite Attic Insulation (VAI)*			
Equipment (check all that apply)			
SS Auger			
SS Spoon	X		
SS Bowl	X		
8-ounce Jar	X		
Three 1-gallon ziplock bags	(P) YES		
Grab (Gr) or Composite (Co)	(P) (Gr) (Co)		
Grab Depth	NA		
Interval (inches)			
No. of Composite Aliquots	5		
No. 1 Depth	2 or 1		
Interval (inches)			
No. 2 Depth	2 or 1		
Interval (inches)			
No. 3 Depth	2 or 1		
Interval (inches)			
No. 4 Depth	2 or 1		
Interval (inches)			
No. 5 Depth	2 or 1		
Interval (inches)			
Sampling Location	Collected from the area where AB3 occurred. Sample was collected from the center of the area and at four points going toward each of the corners, as shown: 		
Draw Aliquot Locations Relative to One Another (also see associated figure):	<p>from the center of the area and at four points going toward each of the corners, as shown: </p> <p>area above raking removed.</p> <p>Another note about activity-based Round (3): all stationing files associated were merged so that their opening panel generally downwindward was about 4 feet off the ground surface.</p>		
Notes:	<p>where the asphalt plant area and vermiculite truck loading area appears to drain into, a ditch is nearby with a culvert leading into it. Floating vermiculite was seen in the ditch water, and vermiculite covers much of the ditch bottom and surrounding area. This area was chosen as the site of the activity because it was low and because of the drain into this area.</p>		

ABnyy with -ABn-B-##
BSyy with -BS-##

-DUP

12/3/09 ACTIVITY-BASED ROUND ③

4.08799 ft/m



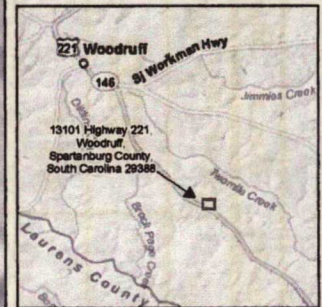
Legend

- Approximate Property Boundary
- Street Boundary
- Railroad



0 50 100 Feet

MAP SOURCE:
ImageConnect/Digital Globe®
GlobeXplorer 04-17-2009



United States Environmental Protection Agency

VERMICULITE PALMETTO
EXFO GAO 148
WOODRUFF,
SPARTANBURG COUNTY,
SOUTH CAROLINA
TDO No. TTEMI-05-003-0078

FIGURE 3
WORKING MAP
OVERALL



TETRA TECH

TDD No.: TTEMI-05-003-0078

Date: 12/3/09

Activity: Bulk Material for ADDITIONAL BULK SAMPLES

Round: NA

Photo No./Facing	0247.JPG / NNW	0248.JPG / NNW	0257.JPG / SSE	0258.JPG / SE
Affix Label Here	56221	56222	56223	56224
Station ID	B\$17	B\$18	B\$19	B\$20
Sample Name	-B\$-31	-B\$-32	-B\$-33	-B\$-34
G148-				
Field Duplicates				
Sample Collection Time	1050	1053	1344	1345
Check One				
Debris ^a				
Soil ^a				
Vermiculite Attic Insulation (VAI) ^a				
Equipment (check all that apply)				
SS Auger				
SS Spoon	X	X	X	X
SS Bowl				
8-ounce Jar	X	X	X	X
Three 1-gallon ziplock bags				
Grab (Gr) or Composite (Co)	(Gr) Co	(Gr) Co	(Gr) Co	(Gr) Co
Grab Depth	NA	NA	NA	NA
Interval (inches)				
No. of Composite Aliquots				
No. 1 Depth				
Interval (inches)				
No. 2 Depth				
Interval (inches)				
No. 3 Depth				
Interval (inches)				
No. 4 Depth				
Interval (inches)				
No. 5 Depth				
Interval (inches)				
Sampling Location	Collected from the outer mass of a pile that had been deposited by truck.	Collected from the outer mass of a pile that had been deposited by a shaker machine (the southwest corner of the shaker).	Collected from the center mass of a pile of vermiculite concentrate stored in a bag that is roof-covered.	Collected from the center mass of a pile of vermiculite concentrate stored in a roof-covered bag (same bag as for sample G448-B\$-33).
Draw Aliquot Locations Relative to One Another (also see associated figure):	This is concentrate vermiculite material. See map - collected from a roof-covered storage bag (Bag A4). Sample location is visible in the middle face of the pile.	This is concentrate vermiculite material. See map - collected from a roof-covered storage bag. The grey pile in the center of the photo is the sampled pile.	This vermiculite is reportedly from Africa and is composed of large pieces of the mineral, some larger than 1/2 inch in rough diameter. All pieces are irregularly shaped.	This vermiculite is reportedly from China and is composed of pieces of the mineral that are mostly about 5mm in diameter, with some as long as almost 10mm, all irregularly shaped. -DUP
Notes:				

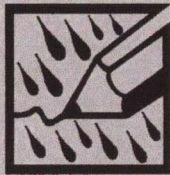
a = Collect debris or soil in one 8-ounce jar and VAI in three 1-gal. ziplock bags.

AAny with -AAn-B-##
ABny with -ABn-B-##
BSy with -BS-##

12/3/09 - ADDITIONAL BULK SAMPLING



LOGBOOK VGA-LOG-Ø3



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No. 371

INCH

"Rite in the Rain"
ALL-WEATHER WRITING PAPER



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Address _____

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Project _____

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook.
Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE
	Logbook	VGA-LOG-03
	Vermiculite General Assessment	
	TDD No	TTEM1-05-003-0116
	Tetra Tech EM, Inc.	
	1955 Evergreen Blvd	
	Bldg 200, Suite 300	
	Duluth, GA 30096	
	Contact:	
TE	John Schendel	404-373-8768
TE	Randy Mayer	225-933-4534
TE	Wendy Robinson	404-731-6242
EPA	Terry Stilman	678-576-6440

4 3/21/2011 TTEMI-05-003-0116

1216 EPA Stillman, START Mayor and
START Robinson arrive at
GAO/48 13101 Hwy 221, Woodruff
Spartanburg County, SC, 29388.
This site was previously sampled
under TDD No. TTEMI-05-003-0078.
This is an active exfoliation
facility of South African
and local ore. ———— UR

1225 Speak with plant manager,
Phil West. ———— UR

1226 Begin walking tour of facility
and sampling locations.

- Near forklift area ———— UR
- Near exfoliator ———— UR
- outside behind warehouse in low
area of property. ———— UR
- two bulk samples also collected.

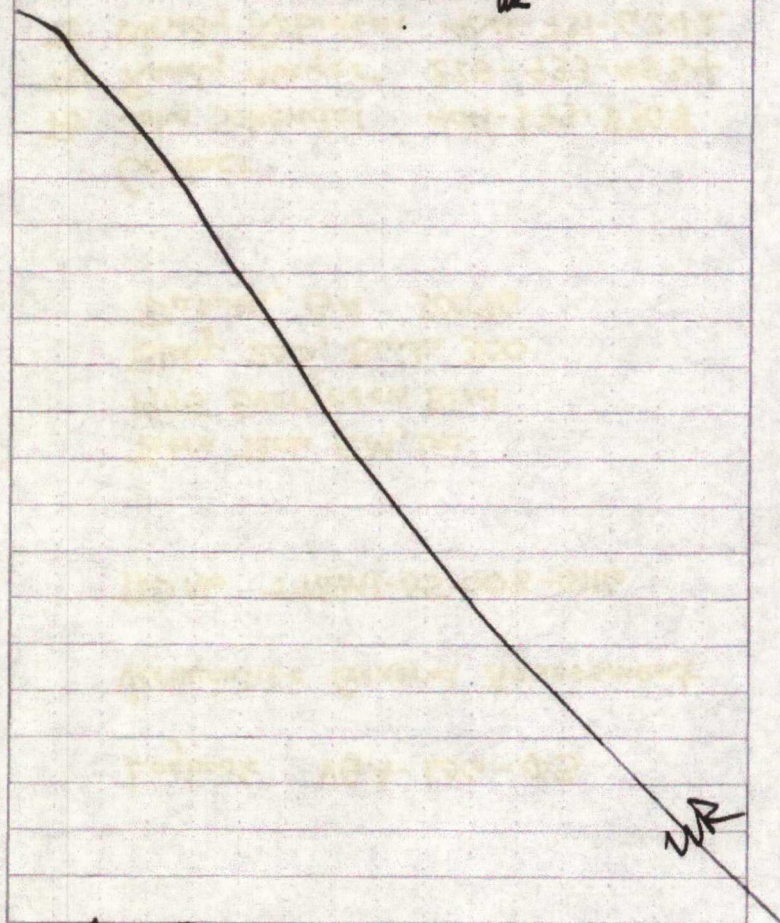
1239 Sampling approach acceptable.
No further sampling required.
Letter report for site owner/
plant manager required in
addition to 05-003-0078 report.
Note today's site visit in #78 report.

Scale: 1 square =

Wendy Robinson

3/21/2011 TTEMI-05-003-0116 5

1242 Depart GAO/48. Head to
location of Enoree Minerals ^{Inc.} Corp.
(Hwy 92 + Hwy ^{US} 26.)
Interstate _{UR}



Wendy Robinson

Scale: 1 square =

*"Outdoor writing products...
...for outdoor writing people."*

LOGBOOK VGA-LOG-φ3



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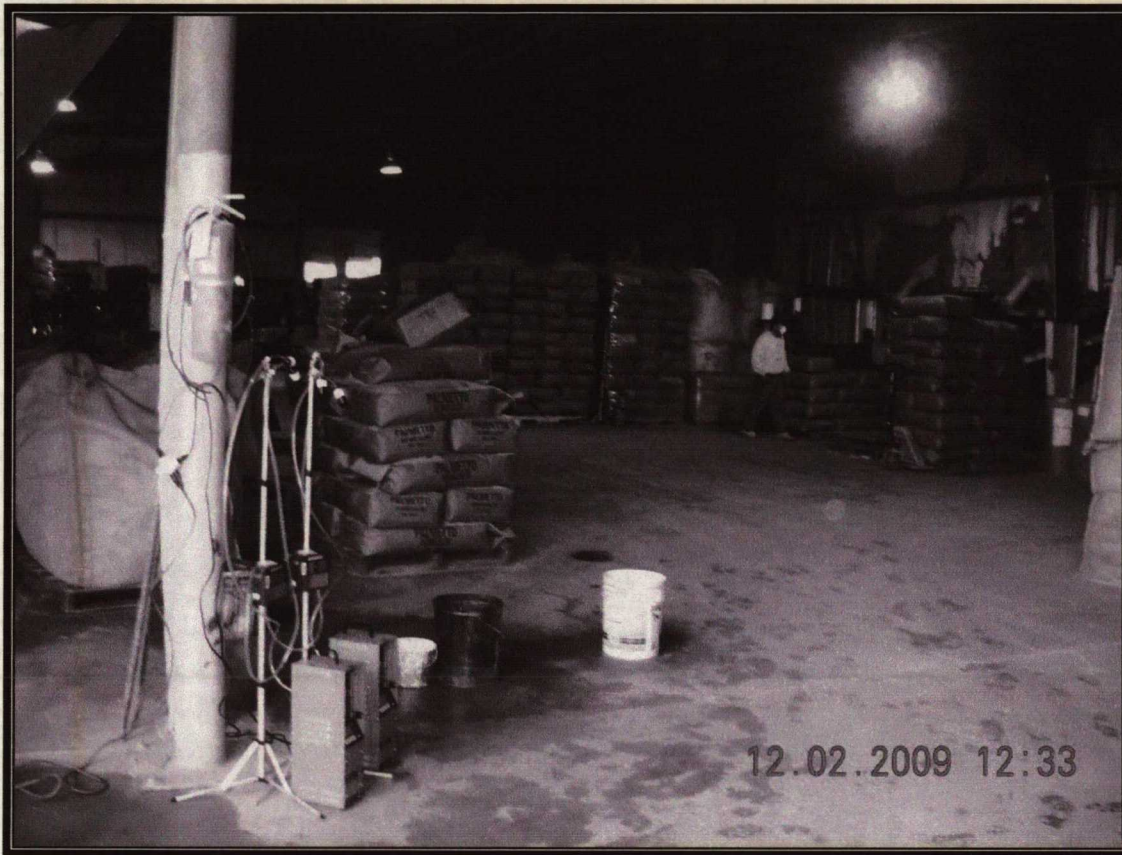
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APPENDIX D
PHOTOGRAPHIC LOG
(12 Pages)



OFFICIAL PHOTOGRAPH NO. 1
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: West **Date:** December 2, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Activity area for activity-based sampling (ABS) air sampling Round 1, which involved activities that were being conducted by personnel of Palmetto Vermiculite, Inc. These activities included bagging of materials and moving materials using a hand cart and a forklift. ABS perimeter upwind (left foreground) and downwind (center background) air samples are identified by their blue pumps and tripod stands arrayed around the activity area. The activity area was located inside the central portion of the large building complex at the GAO 148 site, adjacent to the southeastern side of the structure.



**OFFICIAL PHOTOGRAPH NO. 2
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: North-northwest **Date:** December 2, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: An ABS air sampling Round 1 perimeter downwind air sample set (center background) is identified by the blue pump and tripod stand. This image, taken from within the activity area, shows light reflecting off particles suspended in the air.



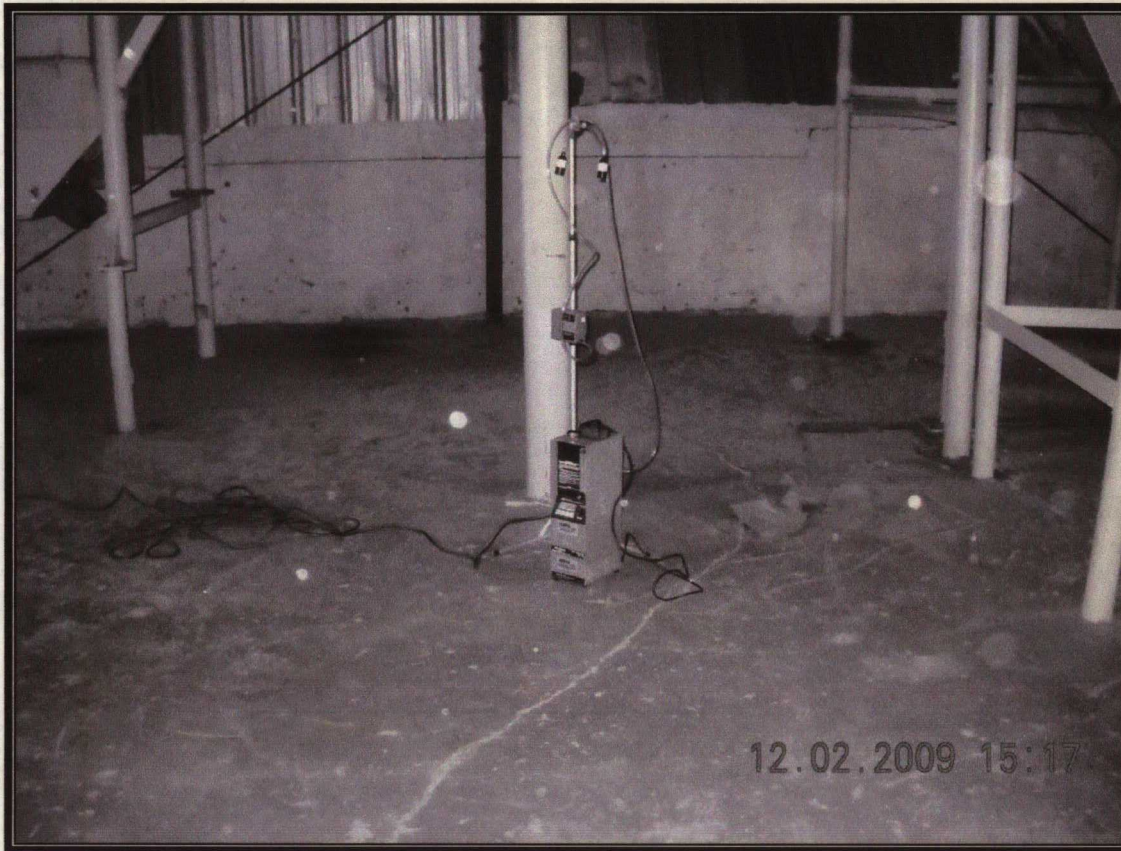
**OFFICIAL PHOTOGRAPH NO. 3
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: South-southwest **Date:** December 2, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Activity area for ABS air sampling Round 2, a sweeping activity. The activity participant is visible in the center of the photograph. ABS perimeter upwind (right foreground) and downwind (left background) air samples are identified by their blue pumps and tripod stands arrayed around the activity area. The activity area was located inside the central portion of the large building complex at the GAO 148 site, adjacent to the northwestern side of the structure. Aside from sweeping, other activities occurred in the vicinity of the activity area during the round, including Palmetto Vermiculite, Inc. personnel using a front-end loader to transport and load material into hoppers adjacent to the activity area.



**OFFICIAL PHOTOGRAPH NO. 4
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: Southeast **Date:** December 2, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: An ABS air sampling Round 2 perimeter downwind air sample set is identified by the blue pump and tripod stand. This image, taken adjacent to the activity area, shows light reflecting off particles suspended in the air.



**OFFICIAL PHOTOGRAPH NO. 5
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: West **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Background air sampling and meteorological monitoring were conducted at the same location on December 3, 2009, near the northwestern boundary of the GAO 148 site property and west of ABS air sampling Round 3. The background sample was G148-BKA-19.



**OFFICIAL PHOTOGRAPH NO. 6
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: Northwest **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Activity area for ABS air sampling Round 3, a raking activity. The participant raked within the area demarcated by the orange cones. ABS perimeter downwind air samples (foreground and right background) are identified by their blue pumps and tripod stands arrayed around the activity area. The activity area was located in a low area in the northern portion of the GAO 148 site property, northwest of the large building complex at the site.



**OFFICIAL PHOTOGRAPH NO. 7
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: Northwest **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: The ABS air sampling Round 3 perimeter upwind air sample set is identified by the blue pump and tripod stand. This image, taken adjacent to the activity area, shows the opening of a nearby culvert (the top of which is visible at left center) with a ditch leading from it (left center to center, behind pump). Material that looked like vermiculite was observed within and on the ground surrounding the ditch.



**OFFICIAL PHOTOGRAPH NO. 8
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: North **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Downward-facing view over the opening of the culvert located near the activity area for ABS air sampling Round 3 (also see Official Photograph No. 7). This image also shows the head of the ditch leading from the culvert, with water in the ditch. Material that looked like vermiculite is visible floating in the water.



OFFICIAL PHOTOGRAPH NO. 9
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: North-northwest **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Additional bulk material sampling location for sample G148-BS-31. This sample was collected from the pile shown, which reportedly consisted of concentrated vermiculite. The pile was in one of several covered storage bays that were located along the southeastern side of the large building complex at the GAO 148 site.



OFFICIAL PHOTOGRAPH NO. 10
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: North-northwest **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Additional bulk material sampling location for sample G148-BS-32. This sample was collected from the pile shown in the center of the image, which reportedly consisted of concentrated vermiculite. The pile was in one of several covered storage bays that were located along the southeastern side of the large building complex at the GAO 148 site.



**OFFICIAL PHOTOGRAPH NO. 11
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: South-southeast **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Additional bulk material sampling location for sample G148-BS-33. This sample was collected from the pile shown, which reportedly consisted of concentrated vermiculite from Africa. The pile was in a covered storage bay that was located inside the northeastern end of the large building complex at the GAO 148 site.



OFFICIAL PHOTOGRAPH NO. 12
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0078 **Location:** Woodruff, SC

Orientation: Southeast **Date:** December 3, 2009

Photographer: John Schendel, Tetra Tech **Witness:** None

Subject: Additional bulk material sampling location for sample G148-BS-34. This sample was collected from the pile shown, which reportedly consisted of concentrated vermiculite from China. The pile was in a covered storage bay that was located inside the northeastern end of the large building complex at the GAO 148 site; this pile was at the opposite end of the same storage bay where the pile for sample G148-BS-33 was located.

TABLE OF WITNESSES
VERMICULITE EXFOLIATION SITE GAO 148
WOODRUFF, SPARTANBURG COUNTY, SOUTH CAROLINA

Mr. Leonardo Ceron
On-Scene Coordinator (OSC)
U.S. Environmental Protection Agency (EPA)
Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303
Telephone No.: (404) 562-9129
ceron.leonardo@epa.gov

Mr. Terry Stilman, OSC
EPA Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303
Telephone No.: (404) 562-8748
stilman.terry@epa.gov

Mr. Phil West
Plant Manager, Palmetto Vermiculite, Inc.
P.O. Box 178
13101 Highway 221
Woodruff, South Carolina 29388
Telephone No.: (800) 729-2796

Dr. John Schendel
Project Manager
Tetra Tech EM Inc. (Tetra Tech)
Superfund Technical Assessment and Response
Team (START)
1955 Evergreen Boulevard
Building 200, Suite 300
Duluth, Georgia 30096
Telephone No.: (678) 775-3089
john.schendel@tetrattech.com

Mr. Randy Mayer
Field Team Leader
Tetra Tech START
1955 Evergreen Boulevard
Building 200, Suite 300
Duluth, Georgia 30096
Telephone No.: (678) 775-3110
randy.mayer@tetrattech.com

Mr. Spencer Smith
Ms. Debbie Kristiansen
Ms. Vicky Farmer
Mr. James Ferreira
Ms. Wendy Robinson
Field Team Members
Tetra Tech START
1955 Evergreen Boulevard
Building 200, Suite 300
Duluth, Georgia 30096
Telephone No.: (678) 775-3080



TETRA TECH




TETRA TECH

APPENDIX F
SAMPLE CHAINS-OF-CUSTODY AND SPREADSHEETS
(Ten Pages)

TDD No. TTEMI-05-003-0078
Vermiculite Exfoliation Site GAO 148

CHAIN OF CUSTODY RECORD

Site #: 10-127 

Contact Name: John Schendel

Contact Phone: 678-775-3089

No: 10-127-03/18/10-0003

Lab: BATTAs Environmental Assoc., Inc.

Lab Phone: 302-737-3376

Lab #	Sample #	Location	Analyses	Matrix	Sample Media	Sample Type	Collected	Sample Time	Numb Cont	Container	Preservative	Volume	Vol Units
	56184	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Lot Blank	12/3/2009	0	1	Cassette	None	0	Liters
	56185	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Lot Blank	12/3/2009	0	1	Cassette	None	0	Liters
	56186	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Blank	12/3/2009	0	1	Cassette	None	0	Liters
	56187	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Blank	12/3/2009	0	1	Cassette	None	0	Liters
	56188	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	1197.6	Liters
	56189	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Duplicate of 56188	12/2/2009	1126	1	Cassette	None	1188.6	Liters
	56190 (a)	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	352.8	Liters

Special Instructions: Refer to instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services. (a) = 5.11e-05

(a) = Filter may be damaged. See Excel spreadsheet, Page 1

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CHAIN OF CUSTODY #

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CHAIN OF CUSTODY RECORD

Site #: 10-127

Contact Name: John Schendel

Contact Phone: 678-775-3089

No: 10-127-03/18/10-0003

Lab: BATTA Environmental Assoc., Inc.

Lab Phone: 302-737-3376



Lab #	Sample #	Location	Analyses	Matrix	Sample Media	Sample Type	Collected	Sample Time	Numb Cont	Container	Preservative	Volume	Vol Units
	56191	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Duplicate of 56190	12/2/2009	1126	1	Cassette	None	354.6	Liters
	56192	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	1194.6	Liters
	56193	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	353.4	Liters
	56194	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	1194.6	Liters
	56195	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	351	Liters
	56196	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	1188.6	Liters
	56197	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1126	1	Cassette	None	351	Liters

Special Instructions: Refer to instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.

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CHAIN OF CUSTODY #

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Lab Phone: 302-737-3376

Site #: 10-127

Contact Phone: 678-775-3089

<p>Special Instructions: Refer to instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.</p>	<p>SAMPLES TRANSFERRED FROM</p> <p>CHAIN OF CUSTODY #</p>
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CHAIN OF CUSTODY RECORD

Site #: 10-127 ϕ

Contact Name: John Schendel

Contact Phone: 678-775-3089

No: 10-127-03/18/10-0003

Lab: BATTA Environmental Assoc., Inc.

Lab Phone: 302-737-3376

Lab #	Sample #	Location	Analyses	Matrix	Sample Media	Sample Type	Collected	Sample Time	Numb Cont	Container	Preservative	Volume	Vol Units
	56205	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1417	1	Cassette	None	362.95	Liters
	56206	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1417	1	Cassette	None	1186.2	Liters
	56207	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/2/2009	1417	1	Cassette	None	351	Liters
	56208	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Duplicate of 56207	12/2/2009	1417	1	Cassette	None	351	Liters
	56210	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/3/2009	1057	1	Cassette	None	1207.2	Liters
	56211	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/3/2009	1057	1	Cassette	None	348	Liters
	56212	GAO 148	ISO 10312: 1995	Air	0.8 um MCE, 25 mm dia.	Field Sample	12/3/2009	1057	1	Cassette	None	1188.6	Liters

Special Instructions: Refer to instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.

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CHAIN OF CUSTODY #

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<p>Special Instructions: Refer to instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.</p>	<p>SAMPLES TRANSFERRED FROM</p>
<p><i>* See Excel spreadsheet, Page 2.</i></p>	<p>CHAIN OF CUSTODY #</p>

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CHAIN OF CUSTODY RECORD

Site #: 10-127

Contact Name: John Schendel

Contact Phone: 678-775-3089

No: 10-127-03/18/10-0002

Lab: IATL

Lab Phone: 856-231-9449

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Special Instructions: Refer to the instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.

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CHAIN OF CUSTODY #

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GAO 148 Air Samples

	Site No	Samp. No	Location	SampleDate	SampleTime	SampleType	Matrix	SampleMedia	Volume	Volume Units	Sampler	Remarks	Container	No. Container	Storage	Preservation	Analyses	Item No.
Lot Blanks	10-0127	56184	GAO 148	12/3/2009	Not applicable	Lot Blank	Air	0.8 um MCE, 25 mm dia.	Not applicable	Liters	John Schendel	Lot Blank, 0.8 um filter	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56185	GAO 148	12/3/2009	Not applicable	Lot Blank	Air	0.8 um MCE, 25 mm dia.	Not applicable	Liters	John Schendel	Lot Blank, 0.8 um filter	Cassette	1	Ambient	None	ISO 10312: 1995	6
Field Blanks	10-0127	56186	GAO 148	12/3/2009	Not applicable	Field Blank	Air	0.8 um MCE, 25 mm dia.	Not applicable	Liters	John Schendel	Field Blank, 0.8 um filter	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56187	GAO 148	12/3/2009	Not applicable	Field Blank	Air	0.8 um MCE, 25 mm dia.	Not applicable	Liters	John Schendel	Field Blank, 0.8 um filter	Cassette	1	Ambient	None	ISO 10312: 1995	6
Activity-Based Round 1 (Routine Facility Operations)	10-0127	56188	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	1197.60	Liters	John Schendel	Activity-Based, Perimeter Upwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56190.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56189	GAO 148	12/2/2009	1126	Field Duplicate of 56188	Air	0.8 um MCE, 25 mm dia.	1188.60	Liters	John Schendel	Activity-Based, Perimeter Upwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56191.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56190	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	352.80	Liters	John Schendel	Activity-Based, Perimeter Upwind, Low Volume. Analyze this sample only if sample 56188 is overloaded. NOTE: At the end of the sampling period the filter may have been damaged when the cassette was pulled. Only spot when removing it from the cassette.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56191	GAO 148	12/2/2009	1126	Field Duplicate of 56190	Air	0.8 um MCE, 25 mm dia.	354.60	Liters	John Schendel	Activity-Based, Perimeter Upwind, Low Volume. Analyze this sample only if sample 56189 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56192	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	1194.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56193.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56193	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	353.40	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56192 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56194	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	1194.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56195.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56195	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	351.00	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56194 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56196	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	1188.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56197.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56197	GAO 148	12/2/2009	1126	Field Sample	Air	0.8 um MCE, 25 mm dia.	351.00	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56196 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
Activity-Based Round 2 (Sweeping)	10-0127	56198	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	1191.60	Liters	John Schendel	Activity-Based, Perimeter Upwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56199.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56199	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	353.40	Liters	John Schendel	Activity-Based, Perimeter Upwind, Low Volume. Analyze this sample only if sample 56198 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56200	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	1179.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56201.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56201	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	357.56	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56200 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56202	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	1173.00	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56203.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56203	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	358.68	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56202 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56204	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	1188.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56205.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56205	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	362.95	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56204 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56206	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	1186.20	Liters	John Schendel	Activity-Based, Backpack, High Volume. Analyze this sample first, and if overloaded, analyze sample 56207.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56207	GAO 148	12/2/2009	1417	Field Sample	Air	0.8 um MCE, 25 mm dia.	351.00	Liters	John Schendel	Activity-Based, Backpack, Low Volume. Analyze this sample only if sample 56206 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56208	GAO 148	12/2/2009	1417	Field Duplicate of 56207	Air	0.8 um MCE, 25 mm dia.	351.00	Liters	John Schendel	Activity-Based, Backpack, Low Volume. This sample has no associated high volume co-located field duplicate sample.	Cassette	1	Ambient	None	ISO 10312: 1995	6

GAO 148 Air Samples

	Site No	Samp No	Location	SampleDate	SampleTime	SampleType	Matrix	SampleMedia	Volume	Volume Units	Sampler	Remarks	Container	No Container	Storage	Preservation	Analyses	Item No.
Site Daily Background	10-0127	56209	GAO 148	12/3/2009	1027	Field Sample	Air	0.8 um MCE, 25 mm dia.	1572.80	Liters	John Schendel	Site Daily Background	Cassette	1	Ambient	None	ISO 10312: 1995	7
Activity-Based Round 3 (Raking)	10-0127	56210	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	1207.20	Liters	John Schendel	Activity-Based, Perimeter Upwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56211.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56211	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	348.00	Liters	John Schendel	Activity-Based, Perimeter Upwind, Low Volume. Analyze this sample only if sample 56210 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56212	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	1188.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56213.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56213	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	354.80	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample if sample 56212 is overloaded. NOTE: This volume is given as a maximum, as at the end of sampling the flow rate was measured to be variable at less than expected before terminating.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56214	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	1191.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56215.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56215	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	352.20	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56214 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56216	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	1173.00	Liters	John Schendel	Activity-Based, Perimeter Downwind, High Volume. Analyze this sample first, and if overloaded, analyze sample 56217.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56217	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	351.60	Liters	John Schendel	Activity-Based, Perimeter Downwind, Low Volume. Analyze this sample only if sample 56216 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56218	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	1183.80	Liters	John Schendel	Activity-Based, Backpack, High Volume. Analyze this sample first, and if overloaded, analyze sample 56219.	Cassette	1	Ambient	None	ISO 10312: 1995	6
	10-0127	56219	GAO 148	12/3/2009	1057	Field Sample	Air	0.8 um MCE, 25 mm dia.	342.60	Liters	John Schendel	Activity-Based, Backpack, Low Volume. Analyze this sample only if sample 56218 is overloaded.	Cassette	1	Ambient	None	ISO 10312: 1995	6

No: 10-127-03/18/10-0001

Site #: 10-127

Contact Name: John Schendel

Contact Phone: 678-775-3089

Lab: IATL

Lab Phone: 856-231-9449

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Special Instructions: Refer to the instructions on sample analysis contained in Tetra Tech's Excel spreadsheet and in the EPA's Request for Analytical Services.

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CHAIN OF CUSTODY #

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GAO 148 Solid Samples

	Site No	Samp No	Location	SampleDate	SampleTime	SampleType	Matrix	SampleCollection	Sampler	Remarks	Container	No. Container	Storage	Preservation	Analyses	Item No.
Bulk Solid Sampling	10-0127	56220	GAO 148	12/3/2009	1318	Field Sample	Bulk Solid	Composite, 5-pt., 0-1 inch bgs or 0-2 inches bgs	Field Team	ABS - Round 3: Raking	8 oz glass jar	1	Ambient	None	CARB 435; ASTM D4643-00; ASTM D422-63 (2007)	1, 2, and 3
	10-0127	56221	GAO 148	12/3/2009	1050	Field Sample	Bulk Solid	Grab, collected from a pile	Field Team	Additional Bulk Sampling	8 oz glass jar	1	Ambient	None	CARB 435; ASTM D4643-00; ASTM D422-63 (2007)	1, 2, and 3
	10-0127	56222	GAO 148	12/3/2009	1053	Field Sample	Bulk Solid	Grab, collected from a pile	Field Team	Additional Bulk Sampling	8 oz glass jar	1	Ambient	None	CARB 435; ASTM D4643-00; ASTM D422-63 (2007)	1, 2, and 3
	10-0127	56223	GAO 148	12/3/2009	1344	Field Sample	Bulk Solid	Grab, collected from a pile	Field Team	Additional Bulk Sampling	8 oz glass jar	1	Ambient	None	CARB 435; ASTM D4643-00; ASTM D422-63 (2007)	1, 2, and 3
	10-0127	56224	GAO 148	12/3/2009	1345	Field Sample	Bulk Solid	Grab, collected from a pile	Field Team	Additional Bulk Sampling	8 oz glass jar	1	Ambient	None	CARB 435; ASTM D4643-00; ASTM D422-63 (2007)	1, 2, and 3

ATTACHMENT 1

ATA& DATA VALIDATION REPORTS

(On compact disc)

ATTACHMENT 2
METEOROLOGICAL MONITORING DATA
(On compact disc)

ATTACHMENT 3
LABORATORY DATA PACKAGES
(On compact disc)